

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE J		PAGE OF PAGES 1 35	
2. AMENDMENT/MODIFICATION NO. 0005		3. EFFECTIVE DATE 08-Feb-2005		4. REQUISITION/PURCHASE REQ. NO. W16ROE-4351-7224		5. PROJECT NO.(If applicable)	
6. ISSUED BY USA ENGINEER DISTRICT, NEW YORK ATTN:CENAN-CT ROOM 1843 26 FEDERAL PLAZA NEW YORK NY 10278		CODE W912DS		7. ADMINISTERED BY (If other than item 6) OFC ENGR & SPEC PROJ TEAM USACOE-NY DISTRICT ENGR MGT BR/OFC ENGR&S NEW YORK NY 10278-0090			
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)				<input checked="" type="checkbox"/> X		9A. AMENDMENT OF SOLICITATION NO. W912DS-05-B-0005	
				<input checked="" type="checkbox"/> X		9B. DATED (SEE ITEM 11) 05-Jan-2005	
						10A. MOD. OF CONTRACT/ORDER NO.	
						10B. DATED (SEE ITEM 13)	
CODE		FACILITY CODE					
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS							
<input checked="" type="checkbox"/> X The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer <input checked="" type="checkbox"/> X is extended, <input type="checkbox"/> is not extended. Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.							
12. ACCOUNTING AND APPROPRIATION DATA (If required)							
13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.							
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.							
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).							
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:							
D. OTHER (Specify type of modification and authority)							
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.							
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) The purpose of this amendment is to make changes/clarification to the Solicitation, Drawings, and Specification for the Military Police Station and demolition of Buildings 132, 135 & 401at Fort Hamilton, Brooklyn, New York; to incorporate new wage rates; add and revise specifications and plans; issue revised bid schedule; and respond to questions from prospective bidders. See Continuation Sheet. Bid Opening Date is extended FROM 10 February 2005 at 2:00 P.M. TO 23 February 2005 at 2:00 P.M. local time, room 1841. Bidders must acknowledge receipt of this amendment by the date specified in the solicitation (or as amended) by one of the following methods: By signing Block 15 below, by separate letter, or by telegram. FAILURE TO ACKNOWLEDGE AMENDMENTS BY THE DATE AND TIME SPECIFIED MAY RESULT IN REJECTIONS OF YOUR BID IN ACCORDANCE WITH THE LATE BID, LATE MODIFICATION OF BIDS, OR LATE WITHDRAWAL OF BIDS (FAR 14.304)							
Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.							
15A. NAME AND TITLE OF SIGNER (Type or print)				16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)			
				TEL: _____ EMAIL: _____			
15B. CONTRACTOR/OFFEROR _____ (Signature of person authorized to sign)		15C. DATE SIGNED		16B. UNITED STATES OF AMERICA BY _____ (Signature of Contracting Officer)		16C. DATE SIGNED 08-Feb-2005	

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

SUMMARY OF CHANGES

SECTION SF 30 - BLOCK 14 CONTINUATION PAGE

The following have been added by full text:

WAGE RATES

Amendment No. 5 for Solicitation No. W912DS-05-B-0005

Military Police Station and Demolition Buildings 132, 135 & 401, Fort Hamilton, NY

Scope of Work:

- New specifications: added
- Revised specifications
- Wage Rates
- Revised Bid Schedule: CLIN 0001 is changed to reflect construction of Bldg 401. Add CLIN 0006 with subClins for B401 demolition with environmental consideration.
- Replies to RFI's from Contractors
- Revised plan

Specifications: Included in this amendment are:

a. New specifications:

Section 08110 STEEL DOORS AND FRAMES
Section 08120 ALUMINUM DOORS AND FRAMES
Section 08210 WOOD DOORS
Section 13080 SIESMIC PROTECTION OF VARIOUS
EQUIPMENT

b. Revised specification:

Section 11193 DETENTION METAL FRAMES, DOORS, AND DOOR
FRAMES
Section 15995A COMMISSSIONING OF HVAC SYSTEM
Section 08710, Para.1.3 Hardware Schedule.

Revised Plan : Include in this amendment is

A - 601

Questions and Answers to RFI's :

Question: The structural steel framing plan appears to be using metric dimensions for beams' depth, and pounds for the weight. Please advise if the WF beams are in pounds or kilos.

Response: The weights are in KILOS.

Question: The drawing list indicates there's drawing A506, however, there's no drawing A506. Clarify.

Response: Drawing was issued in amendment #4.

Question: Amendment #3 doesn't have door specs. Advise.

Response: They will be issued in this amendment.

Question: A letter request for structural steel drawings for B135. A building to be demolished.

Response: No reference steel drawings are available.

Question: Spec for demotion building 401 does not indicate any removal of asbestos or removal by the Government.

- Spec Sect 02222A stated B135 & B123 to be demolished. However, the proposal with schedule of values indicated Buildings 134 & 132 are to be demolished.

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Response:

- See Section 00800, par 35
- Refer to amendment #4

Question: Refer to section 10430, I'm unable to find the exterior sign & metal letter as described in the section.

Response: See Drawing A603, Front Entry Metal wall System. Also see Drawing A503 Partial North Elevation.

Question: In Mechanical spec sect 15895 P.20, there is a description about acoustical duct liner. There is only one page in the specification, which describes the duct liner. There is no information where this liner should be applied.

Answer: No acoustical liner is needed.

Question: For supply, return and exhaust duct material, there is no information.

Answer: Info is in spec sect 15895, para. 2.8 Ductwork Components.

Question: In spec sect 15895 page 41 indicated that exposed duct to be fabricated from stainless steel. Which duct is going to be exposed?

Response: NONE

Question: In drawing M-105 shown 5 pipes between rooms #107 & 108. What are these pipe sizes & where are they going?

Response: The 5 pipes between room #107 & 108 entering into room #120 should be deleted. These pipes used to feed a FCU in room 120. The FCU was deleted, so should be the pipes.

Question: In drawing M-105 shown 2 pipes dia. 80 mm each say "See civil drawings". We do not have civil drawings.

Answer: You should have civil drawings if you have the complete bid package. If you are a sub-contractor, get the civil drawing from the Prime or get it from the Web.

Question: Where is the chiller located? What's the elevation of the chiller? How far the chiller away from the building? What it has to be installed on?

Answer: See C-004

Question: Is there an existing Card Access system? If so, what kind is it and how many card readers are existing on their current network and also what kind of Software are they running?

Response: There is no existing Card Access System in this facility.

Question: Is there any requirement to tie into any other existing card access system?

Response: There is no ties to other existing access card system at this time.

Question: The drawings do not show which cameras exist and which ones do not.

Response: Drawing E -703 shown existing cameras and Note #15 described them.

Question: Are the existing cameras shown on the floor plan already? In which case we will need to subtract that amount; from the counts.

Response: All cameras shown on floor plans are new except those noted to be reconnected as described in note #15, drawing E 703. No subtractions to the counts are required.

Question: The notes described in drawing B704 talks of the 13 existing cameras and 10 access control points which are not described, Are there any card access systems at the gates, if so how many?

Response: All card access control points are new, the 13 existing cameras are noted in drawing E 704.

Question: Is there an existing multiplexer/Matrix switcher/DVR in place right now. Also it looks like I existing camera system and another to be added?

Response: All equipment such as multiplexer/matrix switches/DVR are new. No equipment shown is new except the 13 cameras mentioned in the previous response.

Question: What system is currently being employed for alarm monitoring will everything be added to the Card. Access System for Security?

Response: The card access system is new, none currently used.

Question: Who is providing the locks? CCTV notes on drawing E-703 indicated that electric strikes need to be provided. Please clarify on this point.

Response: Locks provided by the contractor. Drawings do not delineate responsibilities as to who provides equipment shown.

Question: Do the fiber cables already exist? Are any new cables needed for existing cameras only?

Answer: No fiber optic cables be installed under this project to reconnect the cameras, see note #18 of drawing E 703.

Question: Do we need to provide surge suppression for existing cameras also?

Answer: No surge suppression is required for the existing cameras only. New cameras require surge suppression.

Question: The riser drawing shows 2 head ends with digital recorders and multiple computers. Could you please find out where the second head end is located as per drawing E-703?

Response: Head end for the CCTV and card access system is located within the 24 hours desk and room 120 (Front Desk), Only one head end is shown for the card access and CCTC system.

Question: In the drawing E-703, in the right corner, you shall see they

have one camera picture and the notation says that it pertains to, Cameras 2 through 15. Are we to assume that this is part of the cameras shown at the top of the same-drawing with cameras labeled camera 1 through 16?

Answer: The numbers shown are only designated to show inputs.

Question: Should the new system contain a Matrix switcher or Multiplexer or be added to existing Systems?

Answer: All equipment show in the drawings are new and shall be provided in accordance with drawings and specifications. Combination multiplex/switcher shall be provided.

Question: Who is responsible for vehicle gate operators or do they exist?

Are we to provide input/output modules for them only? What about readers?

Answer: Vehicle gate operators, input, output modules and card readers shall be provided by the contractors.

Question: Who shall be providing the public address system for Military Police Station?

Answer: The PA system shall be provided by the contractor as shown in the drawings and specifications.

Question: Who shall be providing the ceiling mounted microphones?

Response: Ceiling mount microphones shall be provided by the contractor.

Question: The count on the riser of equipments does not seem to cc-inside with that on the floor plan.

Response: The equipment counts are correct. See drawings E 704 for additional cameras and equipment to be provided under this contract.

Question: Is this a prevailing wage Local Electrical union job or could it be a GSA approved job?

Answer: Wage rates are provided in the specification. This is a HUB zone IFB contract advertised by US Army Corps of Engineers, NY District.

Question: Section 15400A specifies PVC piping. NYC codes prohibits the use of PVC piping.

Response: We use Uniform Facility Guide Specs for all DoD projects for all military installations.

Question: The door schedule (sheet A601) there are no hardware set numbers listed. Also, the hardware specification does not provide any particular information on what hardware to provide for each door. Can you please provide a hardware set number for each door and include a specification indicating the set number and what is required for each door?

Response: See revised A601 of this amendment.

Question: Amendment 4 included specifications section 13280A and 13283N. However, the specification sections are missing tables of quantities. In order to provide a responsible proposal, please provide tables of quantities.

Response: For asbestos, lead quantities, see revised bid schedule

UNIT PRICE SCHEDULE

MILITARY POLICE STATION
FORT HAMILTON, BROOKLYN, NEW YORK

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	ESTIMATED PRICE	AMOUNT
1	All work for the construction of the Military Police Station, complete, except for the items listed below.	XX	LS	XX	\$_____
2	Excavation and removal of oil-contaminated soil at the site of Building 401, complete.	191	CUBIC METERS	\$_____	\$_____
3	Excavation and removal of oil-contaminated concrete at the site of Building 401, complete.	19	CUBIC METERS	\$_____	\$_____
4	Soil Backfill at the site of Building 401, complete.	210	CUBIC METERS	\$_____	\$_____
5	Demolition of Building 135 and Building 132, and removal of debris, complete.	XX	LS	\$_____	\$_____
6	All work for the demolition of Bldg. 401				
6a	All work for the demolition of Building 401, does not include CLINS 0006b, 0006c & 0006d	XX	LS	\$_____	\$_____
6b	Removal of asbestos pipe insulation	50	METERS	\$_____	\$_____
6c	Removal of asbestos floor tile	10	SQ. METERS	\$_____	\$_____
6d	Removal of Lead Paint	10	SQ METERS	\$_____	\$_____

TOTAL AMOUNT FOR CLINS 0001-0006D \$_____

General Decision Number: NJ030003 01/28/2005 NJ3

Superseded General Decision Number: NJ020003

State: New Jersey

Construction Types: Building, Heavy and Highway

Counties: Bergen, Essex, Hudson, Hunterdon, Middlesex, Morris, Passaic, Somerset, Sussex, Union and Warren Counties in New Jersey.

Does not include building construction in Hunterdon and Somerset Counties

BUILDING CONSTRUCTION PROJECTS (does not include single family homes and apartments up to and including 4 stories) (does not include building construction in Hunterdon or Somerset Counties)

HEAVY AND HIGHWAY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	06/13/2003
1	12/19/2003
2	01/23/2004
3	02/27/2004
4	03/05/2004
5	03/19/2004
6	05/07/2004
7	06/04/2004
8	07/02/2004
9	08/13/2004
10	01/28/2005

* ASBE0032-001 09/01/2004

BERGEN, ESSEX, HUDSON, HUNTERDON (Remainder), MIDDLESEX (Remainder), MORRIS, PASSIAC, SOMERSET (Remainder), SUSSEX, UNION, & WARREN (Remainder) COUNTIES:

	Rates	Fringes
Asbestos Workers/Insulator		
Includes the application		
of all insulating		
materials, protective		
coverings, coatings and		
finishings to all types of		
mechanical systems.....	\$ 36.27	20.91

* ASBE0089-001 09/01/2004

HUNTERDON (Alexander, Bethlehem, Bloomsbury, Clinton, Delaware, East Armwell, Flemington, Franklin, Frenchtown, Glen Garden, Hampton, High Bridge, Holland, Kingwood, Lambertville, Lebanon, Milford, Raritan, Readington, Stockton, Union, and West Armwell Twps), MIDDLESEX (Cranbury, East Brunswick, Helmatta, Jamesburg, Milltown, Monroe, North Brunswick, Plainsboro, South Brunswick, and Spotswood Twps), SOMERSET (Branchburg, Franklin, Hillsborough, Manville, Millstone, Montgomery and Rocky Hill Twps), AND WARREN (Franklin, Greenwich, Hamony, Lopatcong, Oxford, Phillipsburg, Washington, and White Twps) COUNTIES

	Rates	Fringes
Asbestos Workers/Insulator Includes the application of all insulating materials, protective coverings, coatings, and finishings to all types of mechanical systems.....	\$ 30.00	10.00

* BOIL0028-001 08/01/2004		

	Rates	Fringes
Boilermaker.....	\$ 34.28	44% + 7.83

* BRNJ0004-001 11/01/2003		

BERGEN, ESSEX, HUDSON, MORRIS, PASSAIC, SUSSEX, UNION, WARREN, the following parts of HUNTERDON, and SOMERSET COUNTIES: (at Old Mill Inn Route #202 follow Passaic River to the Dean River from thence to Sunset Lake at Pluckemin, follow Chambers Brook to Oldwick to Fairmount, Hunderton County across the county line to Long Valley in Morris County, thence across from Long Valley into Chester, three miles North of Chester to Muskrat, then back across into Ralston, Morris County, then follow Morris-Somerset County line into Mendham Township, then across Morris County line into Somerset, back to the Old Mill Inn in Bernardsville, Route #202, Somerset County)

	Rates	Fringes
Bricklayer, Cement Mason, Plasterer & Stonemason.....	\$ 31.37	15.55

* BRNJ0005-002 01/01/2004		

HUNTERDON (Annadale, Califon, Lebanon, Oldwick, Readington, Three Bridges, & White House Station Twps.), MIDDLESEX (except Dunellen, Middlesex, Oak Tree, New Market, and South Plainfield Twps), AND SOMERSET (Remainer) COUNTIES

Rates	Fringes
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Bricklayer, Cement Mason, Plasterer & Stonemason.....	\$ 30.55	15.40
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* CARP0006-001 05/01/2004

BERGEN County (east of the Hackensack River); HUDSON COUNTY
(east of the Hackensack River):

	Rates	Fringes
Carpenter.....	\$ 33.38	15.02
Millwright.....	\$ 33.07	44% + .21

* CARP0015-001 05/01/2004

BERGEN COUNTY (west of the Hackensack River (does not include
the city of Garfield, or the Boroughs of Lodi and Wallington):

	Rates	Fringes
Carpenter.....	\$ 33.38	15.02
Millwright.....	\$ 33.07	44% + .21

* CARP0029-003 05/01/2004

	Rates	Fringes
Soft Floor Layer.....	\$ 31.04	40.23% + .04

* CARP0031-002 05/01/2004

HUNTERDON COUNTY (starting at the south of the town of
Frenchtown on the Delaware River, thence following the line in
the center of the road to Bapistown to Croton to the City of
Flemington to Flemington Junction to Three Bridges, thence
following the Somerset County line northward, all territory
south of this line including the city of Flemington); SOMERSET
COUNTY (all territory south of a line beginning at Amwell on
the county line to Zion to Fairview to Dutchtown to Plainsville
to Bell Mead to Griggstown to the Delaware and Raritan Canal):

	Rates	Fringes
Carpenter.....	\$ 33.38	15.02

* CARP0041-002 05/01/2004

ESSEX COUNTY (Township of Millburn); MIDDLESEX AND MORRIS
COUNTIES; SOMERSET COUNTY (Municipalities of Greenbrook, North
Plainfield, Watchung, and all communities East of King George's
Road); SUSSEX AND UNION COUNTIES:

	Rates	Fringes
Carpenter & Insulator.....	\$ 33.38	15.02
Millwright.....	\$ 33.07	44% + .21

CARP0099-001 05/01/2004

	Rates	Fringes
Lather.....	\$ 33.85	14.55

* CARP0124-001 05/01/2004

BERGEN COUNTY (City of Garfield and Boroughs of Lodi and Wallington); PASSAIC COUNTY:

	Rates	Fringes
Carpenter.....	\$ 33.38	15.02
Millwright.....	\$ 33.07	44% + .21

* CARP1342-001 05/01/2004

ESSEX COUNTY (does not include the township of Millburn); HUDSON COUNTY (west of the Hackensack River):

	Rates	Fringes
Carpenter.....	\$ 33.38	15.02
Millwright.....	\$ 33.07	44% + .21

CARP1456-001 05/01/2003

	Rates	Fringes
Diver Tender.....	\$ 28.82	26.41
Diver.....	\$ 38.28	26.41

* CARP1456-002 05/01/2003

	Rates	Fringes
Dock Builder & Piledriver person.....	\$ 31.54	26.41

* ELEC0102-001 06/01/2003

MORRIS, PASSAIC, SUSSEX, UNION AND WARREN COUNTIES:

	Rates	Fringes
Line Construction:		
Cable Splicers.....	\$ 42.13	42.5%
Groundmen.....	\$ 22.98	42.5%
Lineman & Equipment		

Operators.....	\$ 38.30	42.5%
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* ELEC0102-002 06/01/2004

MORRIS, PASSAIC, SUSSEX, UNION AND WARREN COUNTIES:

	Rates	Fringes
Cable splicer.....	\$ 44.52	45%
Electrician.....	\$ 40.47	45%

* ELEC0164-001 08/15/2000

BERGEN, ESSEX AND HUDSON COUNTIES:

	Rates	Fringes
Line Construction:		
Cable Splicer.....	\$ 38.89	41%
Groundman.....	\$ 20.66	41%
Lineman, Welder,X-Ray Technician, Equipment Repairman, & Equipment Serviceman.....	\$ 34.42	41%

* ELEC0164-002 06/01/2004

BERGEN, ESSEX AND HUDSON COUNTIES:

	Rates	Fringes
Cable splicer.....	\$ 46.76	45.5%
Electrician.....	\$ 41.10	45.5%

* ELEC0262-006 12/01/1994

MIDDLESEX COUNTY (area north and west of a line following the Philadelphia and Reading Railroad east from the Raritan River to Dismal Road, northeast on Dismal Road to Park Avenue, north on Park Avenue to the Lehigh Valley Railroad, and northeast along that railroad to the Union County line):

	Rates	Fringes
Line Construction:		
Groundmen.....	\$ 21.06	11.7% + 3.76
Linemen, Cable Splicers.....	\$ 22.87	11.7% + 3.76

* ELEC0358-002 06/01/1998

MIDDLESEX COUNTY (remainder of county):

Rates	Fringes
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Line Construction:

Cable Splicer.....	\$ 33.89	43%
Certified Welder Lineman....	\$ 31.77	43%
Groundman & Winch Operator..	\$ 29.47	43%
Linemen, Hole Digger Operator, Truck w/o Winch or Pole & Steel Hand, Truck w/o Winch, X-ray Technician & Equip. Repairer	\$ 30.26	43%

* ELEC0456-001 06/01/2004

MIDDLESEX COUNTY:

	Rates	Fringes
Cable splicer.....	\$ 42.04	47%
Electrician.....	\$ 39.92	47%

* ELEC0456-002 06/01/2002

MIDDLESEX COUNTY (area south and west of a line extending east from the Raritan River along the Philadelphia and Reading Railroad to Shelton Rd., south on Shelton Rd. to Lincoln Hwy. to Vineyard Rd. to Old Post Rd., along Old Post Rd. to Mill Rd., along Mill Rd., along Mill Rd. to the Raritan River, along the Raritan River to the South River, along the South River to the southern boundary of the Borough of South River, along this boundary to the Cranbury South River Turnpike, along this road continuing on to Washington Rd. and Maplewood Ave. in Cranbury to Scott Ave., along Scott Ave. to Main St., on Main St. and the turnpike to Millstone River):

	Rates	Fringes
Line Construction:		
Cable Splicer.....	\$ 38.95	45.75%
Groundmen.....	\$ 33.98	45.75%
Linemen.....	\$ 34.77	45.75%
Winch Operator.....	\$ 33.98	45.75%

* ELEV0001-001 01/01/2004

	Rates	Fringes
Elevator Mechanic		
Construction.....	\$ 39.265	14.845 + a + b
Modernization.....	\$ 31.43	14.695 + a + b

a. PAID HOLIDAYS:

New Year's Day, Lincoln's Birthday, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veteran's Day, Election Day, Thanksgiving Day, and Christmas Day.

b. VACATION PAY CREDIT:

A worker with 6 months but less than 5 years of service receives two weeks vacation; a worker with 5 years or more of service receives three weeks vacation.

 * ENGI0825-003 07/01/2004

	Rates	Fringes
Power equipment operator - tank erection:		
GROUP 1.....	\$ 37.61	18.90 + a
GROUP 2.....	\$ 36.77	18.90 + a
GROUP 3.....	\$ 38.75	18.90 + a
GROUP 4.....	\$ 34.68	18.90 + a
GROUP 5.....	\$ 29.47	18.90 + a

Hazardous waste removal:

Work where the worker is in direct contact with hazardous material, and when personal protective equipment is required for respiratory, skin and eye protection: 20% per hour additional.

a. PAID HOLIDAYS:

New Year's Day, Washington's Birthday observed, Memorial Day, Independence Day, Labor Day, Presidential Election Day, Veteran's Day, Thanksgiving Day and Christmas Day; provided 1) that the worker works three of the preceding five work days before the holiday; or, the work day before the holiday and the work day after the holiday; and, 2) that the worker works the work day before and the work day after the holiday.

POWER EQUIPMENT OPERATORS - TANK ERECTION CLASSIFICATIONS

GROUP 1: Operating engineer - on all cranes and derricks with boom including jib 140 ft. or more above the ground

GROUP 2: Operating engineer - on all equipment, including cranes and derricks with boom including jib, less than 140 ft. above the ground

GROUP 3: Helicopter pilot

GROUP 4: Air compressor, welding machine and generator (gas, diesel, or electric equipment and sources of power from a permanent plant (steam, compressed air, hydraulic or other power), for the operation of any machine or automatic tool used in the erection, alteration, repair and dismantling of tanks and any and all "dual-purpose" trucks used on the construction job site

GROUP 5: Oiler

 * ENGI0825-004 07/01/2004

	Rates	Fringes
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Power equipment operator -
steel erection:

GROUP 1.....	\$ 36.89	18.90 + a
GROUP 2.....	\$ 36.98	18.90 + a
GROUP 3.....	\$ 34.59	18.90 + a
GROUP 4.....	\$ 32.03	18.90 + a
GROUP 5.....	\$ 30.50	18.90 + a
GROUP 6.....	\$ 28.74	18.90 + a
GROUP 7.....	\$ 39.25	18.90 + a

Hazardous waste removal:

Work where the worker is in direct contact with hazardous material, and when personal protective equipment is required for respiratory, skin and eye protection: 20% per hour additional.

a. PAID HOLIDAYS:

New Year's Day, Washington's Birthday observed, Memorial Day, Independence Day, Labor Day, Presidential Election Day, Veteran's Day, Thanksgiving Day and Christmas Day; provided 1) that the worker works three of the preceding five work days before the holiday; or, the work day before the holiday and the work day after the holiday; and, 2) that the worker works the work day before and the work day after the holiday.

POWER EQUIPMENT OPERATORS - STEEL ERECTION CLASSIFICATIONS

GROUP 1: Cranes (all cranes, land or floating with boom including jib 140 ft. and over, above ground); derricks (all derricks, land or floating with boom including jib 140 ft. and over, above ground)

GROUP 2: Cranes (all cranes, land or floating with boom including jib less than 140 ft. above ground); derricks (all derricks, land or floating with boom including jib, less than 140 ft. above ground)

GROUP 3: "A" frame; cherry picker, 10 tons and under; hoist (all types of hoist, shall also include steam, gas, diesel, electric, air, hydraulic, single and double drum, concrete, brick shaft caisson, or any other similar type hoisting machines, portable or stationary, except Chicago boom type); jack (screw, air, hydraulic power-operated unit console type (not hand jack or pile load test type); side boom

GROUP 4: Aerial platform used as a hoist; compressor, 2 or 3 in battery; elevator or house car; conveyor and tugger hoist; fire person; forklift; generator, 2 or 3; maintenance - utility person; rod bending machine (power); welding machine (gas or electric, 2 or 3 in battery, including diesel); captain, power boats; tug master, power boats

GROUP 5: Compressor, single; welding machine, single; gas,

electric converters of any type, diesel; welding system
multiple (rectifier, transformer type); generator, single

GROUP 6: Oiler; straddle carrier

GROUP 7: Helicopter pilot

* ENGI0825-005 07/01/2004

	Rates	Fringes
Power equipment operator - oilostatic mainline & transportation pipeline:		
GROUP 1.....	\$ 35.75	18.90 + a
GROUP 2.....	\$ 35.10	18.90 + a
GROUP 3.....	\$ 31.96	18.90 + a
GROUP 4.....	\$ 30.56	18.90 + a
GROUP 5.....	\$ 28.74	18.90 + a
GROUP 6.....	\$ 37.68	18.90 + a

Hazardous waste removal: 20% per hour additional.

a. PAID HOLIDAYS:

New Year's Day, Washington's Birthday, Memorial Day,
Independence Day, Labor Day, Veteran's Day, Thanksgiving
Day and Christmas Day.

DEFINITION OF GROUPS:

GROUP 1: Backhoe; crane (all types); dragline; front end
loader (5 cu. yd. and over); gradall; scooper (loader and
shovel); Koehring and trench machine

GROUP 2: "A" frame/backhoe combination; hoe loader; boring
and drilling machine; ditching machine, small; ditchwitch
or similar type; forklift; front end loader (2 cu. yd. and
over but less than 5 cu. yd.); grader, finish (fine);
hydraulic crane, 10 tons and under (over 10 tons - crane
rate applies); side boom and winch truck (hoisting)

GROUP 3: Backfiller; broom and sweeper; bulldozer;
compressor (2 or 3 in battery); front end loader (under 2
cu. yd.); generator; giraffe grinder; grader and motor
patrol; mechanic; pipe bending machine (power); tractor;
water and sprinkler truck; welder and repair mechanic

GROUP 4: Compressor (single); dope pot (mechanical with or
without pump); dust collector; farm tractor; pump (4-in.
suction and over); pump (2, less than 4-in. suction); pump,
diesel engine and hydraulic (immaterial of power); welding
machine, gas or electric converter of any type, single;
welding machine, gas or electric converter of any type, 2
or 3 in battery; multiple welder; wellpoint system
(including installation and maintenance)

GROUP 5: Oiler; grease person; gas, fuel and supply trucks;
tire repair and maintenance

GROUP 6: Helicopter pilot

* ENGI0825-009 07/01/2004

	Rates	Fringes
Power Equipment Operator		
GROUP 1.....	\$ 35.12	18.90 + a
GROUP 2.....	\$ 33.53	18.90 + a
GROUP 3.....	\$ 31.62	18.90 + a
GROUP 4.....	\$ 29.99	18.90 + a
GROUP 5.....	\$ 28.28	18.90 + a
GROUP 6.....	\$ 36.94	18.90 + a

Hazardous waste removal: 20% per hour additional.

a. PAID HOLIDAYS:

New Year's Day, Washington's Birthday, Memorial Day,
Independence Day, Labor Day, Veteran's Day, Thanksgiving
Day and Christmas Day.

DEFINITION OF GROUPS:

GROUP 1: Autograde - combination subgrader; base metal spreader and 7 base trimmer (CMI and similar types); autograde placer, trimmer, spreader combination (CMI and similar types); autograde slipform paver (CMI and similar types); backhoe; central power plant (all types); concrete paving machine; crane (all types, including overhead and straddle traveling type); crane; gantry; derrick (land or floating); drillmaster; quarrymaster (down-the-hole drill); rotary drill; self-propelled hydraulic drill; self-powered drill; dragline; elevator grader; front end loader (5 cu. yd. and over); gradall; grader; raygo; locomotive (large); mucking machine; pavement and concrete breaker (superhammer and hoe ram); pile driver (length of boom, including length of leads, shall determine premium rate applicable); roadway surface grinder; scooper (loader and shovel); shovel; tree chopper with boom; trench machine

GROUP 2: "A" frame/backhoe (combination); boom attachment on loader (rate based on size of bucket, not applicable to pipehook); boring and drilling machine; brush chopper; shredder; tree shedder; cableway; carryall; concrete pump; concrete pumping system; pumpcrete and similar type; conveyor, 125 ft. and over; drill doctor including dust collector, maintenance); front end loader (2 cu. yd. but less than 5 cu. yd.); grader (finisher); groove cutting machine (ride-on type); header planer; hoist (all types of hoists, shall also include steam, gas, diesel, electric, air, hydraulic, single and double drum, concrete brick shaft caisson, snorkel roof, and/or any other similar type hoisting machine, portable or stationary, except Chicago

boom type); hoist (Chicago boom type); hydraulic crane, 10 tons and under; hydro-axle; jack screw air hydraulic power-operated unit or console type (not hand jack or pile load test type); log skidder; pan; paver (all concrete); pumpcrete machine; squeezecrete and concrete pump (regardless of size); scraper; side boom; straddle carrier, Ross and similar type; winch truck (hoisting)

GROUP 3: Asphalt curbing machine; asphalt plant engineer; asphalt spreader; autograder tube finisher and texturing machine (CMI and similar types); autograde curecrete machine (CMI and similar types); autograde curb trimmer and sidewalk; shoulder; slipform (CMI and similar type); bar bending machine (power); batcher; batching plant and crusher on site; belt conveyor system; boom-type skimmer machine; bridge deck finisher; bulldozer (all); car dumper (railroad); compressor and blower-type unit (used independently or mounted on dual-purpose truck, on jobsite or in conjunction with jobsite, in loading and unloading of concrete, cement, fly ash, instantcrete, or similar type materials); compressor (2 or 3) (battery); concrete finishing machine; concrete saw and cutter (ride-on type); concrete spreader; hetzel; rexomatic and similar type; concrete vibrator; conveyor, under 125 ft.; crushing machine; ditching machine, small (ditchwitch or similar type); dope pot (mechanical with or without pump); dumpster; elevator; fireperson; forklift (Economobile); lull and similar type of equipment; front end loader (1 cu. yd. and over but less than 2 cu. yd.); generator (2 or 3) in battery; giraffe grinder; grader; motor patrol; gunite machine (excluding nozzle); hammer, vibratory (in conjunction with generator); hoist (roof, tugger, aerial platform hoist and house cars); hopper; hopper door (power-operated); ladder (motorized); laddervator; locomotive, dinky type; maintenance, utility person; mechanic; mixer (except paving mixer); pavement breaker, small, self-propelled ride-on type (also maintaining compressor or hydraulic unit); pavement breaker, truck-mounted; pipe bending machine (power); roller, blacktop; scale, power; seaman pulverizing mixer; shoulder widener; silo; skimmer machine (boom type); steel cutting machine; servicing and maintaining tractors; tug captain; vibrating plant (used in conjunction with unloading); welder; repair mechanic; concrete cleaning/decontamination machine operator; directional boring machine; heavy equipment robotics operator/technician; master environmental maintenance technician; ultra-high-pressure waterjet cutting tool system operator/maintenance technician; vacuum blasting machine operator/maintenance technician

GROUP 4: Broom and sweeper; chipper; compressor (single); concrete spreader (small type); conveyor loader (not including elevator grader); engine, large diesel (1620 H.P.); staging pump; farm tractor; fertilizing equipment (operation and maintenance); fine grade machine (small

type); form line grader (small type); front end loader (under 1 cu. yd.); generator (single); grease, gas, fuel and oil supply truck; heater (Nelson or other type including propane, natural gas or flow-type unit); light, portable generating light plant; mixer, concrete, small; mulching equipment (operation and maintenance); pump (4-inch suction and over, including submersible pump); pump (diesel engine and hydraulic, immaterial of power); road finishing machine (small type); roller, grade, fill or stone base; seeding equipment (operation and maintenance of); sprinkler and water pump truck; steam jenny and boiler; stone spreader; tamping machine, vibrating ride-on; temporary heating plant (Nelson or other type, including propane, natural gas or flow-type unit); water and sprinkler truck; welding machine (gas, diesel, and/or electric converter of any type, single, two or three in a battery); welding system, multiple (rectifier transformer type); wellpoint system

GROUP 5: Oiler

GROUP 6: Helicopter pilot

* IRON0011-002 07/01/2002

BERGEN, ESSEX AND HUDSON COUNTIES; HUNTERDON COUNTY (west half); MIDDLESEX COUNTY (north half); MORRIS AND PASSAIC COUNTIES; SOMERSET COUNTY (north half); SUSSEX AND UNION COUNTIES:

	Rates	Fringes
Ironworkers:		
Reinforcing.....	\$ 27.63	24.10
Structural.....	\$ 29.53	24.10

* IRON0036-003 07/01/2003

WARREN COUNTY:

	Rates	Fringes
Ironworkers; Structural, Reinforcing and Ornamental.....	\$ 29.95	14.02

* IRON0068-004 07/01/2003

HUNTERDON COUNTY (east half); MIDDLESEX COUNTY (south half);
AND SOMERSET COUNTY (south half):

	Rates	Fringes
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Ironworkers:

Ornamental & structural.....	\$ 28.41	23.80
Reinforcing.....	\$ 26.41	23.80

* LABO0222-002 05/01/2004

BUILDING CONSTRUCTION:

	Rates	Fringes
Laborer		
GROUP 1.....	\$ 24.65	13.37
GROUP 2.....	\$ 24.15	13.37
GROUP 3.....	\$ 20.53	13.37

DEFINITION OF GROUPS:

GROUP 1: Jackhammer; tamper; motorized tamper and compactor;
street cleaning machine; scaffold builder; hydro;
demolition equipment; all types of motorized forklift;
riding motor buggy operator; Bobcat operator; mortar
person; burner; nozzle person on gunite work

GROUP 2: All laborers not listed in Groups 1 or 3

GROUP 3: Laborer doing janitorial-type light clean-up work
associated with the turnover of the project to the owner;
flag person; laborer manning temporary heat of all types

* LABO0472-002 03/01/2002

FREE AIR TUNNEL:

	Rates	Fringes
Laborers:		
GROUP 1.....	\$ 27.25	12.95 + a
GROUP 2.....	\$ 23.85	12.95 + a
GROUP 3.....	\$ 23.70	12.95 + a
GROUP 4.....	\$ 23.20	12.95 + a

a. PAID HOLIDAYS:

New Year's Day, Washington's Birthday, Memorial Day,
Independence Day, Labor Day, Presidential Election Day,
Veteran's Day, Thanksgiving Day and Christmas Day, provided
the worker works three days for the same employer within a
period of ten working days consisting of five working days
before and five working days after the day upon which the
holiday falls or is observed.

DEFINITION OF GROUPS:

GROUP 1: Blaster

GROUP 2: Skilled laborer (miner, drill runner, iron laborer,
maintenance laborer, conveyor laborer, safety miner,

rigger, block layer, cement finisher, rod person, caulker, powder carrier, all other skilled laborers)

GROUP 3: Semi-skilled laborer (chuck tender, track laborer, nipper, brake person, derail laborer, cable laborer, hose laborer, grout laborer, gravel laborer, form laborer, bell or signal laborer (top or bottom), form worker and mover, concrete worker, shaft person, tunnel laborer, all other semi-skilled laborers)

GROUP 4: All other top laborers

* LAB00472-003 03/01/2003

	Rates	Fringes
Laborers:		
GROUP 1.....	\$ 25.30	11.80 + a
GROUP 2.....	\$ 25.50	11.80 + a
GROUP 3.....	\$ 25.80	11.80 + a
GROUP 4.....	\$ 26.00	11.80 + a
GROUP 5.....	\$ 26.25	11.80 + a
GROUP 6.....	\$ 29.80	11.80 + a
GROUP 7-A.....	\$ 28.30	11.80 + a
GROUP 7-B.....	\$ 26.30	11.80 + a

a. PAID HOLIDAYS:

New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Presidential Election Day, Veteran's Day, Thanksgiving Day and Christmas Day, provided the worker works three days for the same employer within a period of ten working days consisting of five working days before and five working days after the day upon which the holiday falls or is observed.

LABORER CLASSIFICATIONS - HEAVY & HIGHWAY

GROUP 1: Common laborers; landscape laborers; railroad track laborers; pitmen and dumpmen; waterproofing; rakers and tampers on cold patch work and wrapping and coating all pipe Asphalt Laborers:

GROUP 2: Powder carriers and magazine tenders; signalmen Asphalt Raker, & Asphalt Screedman

GROUP 3: Sewer pipe; laser men; conduit and duct line layers; jackhammer; chipping hammers; pavement breakers; power buggies; concrete cutters, asphalt cutters; sheet hammer and tree cutter operators; sandblasting, cutting, burning, Power Tool Operator, and such other power tools used to perform work usually done manually by laborers

GROUP 4: Wagon drill operator; timberman; drill master

GROUP 5: Finisher; form setter; rammer; paver; gunite nozzle man and stone cutter; Catch Basin or Inlet Builder Manhole

GROUP 6: Blaster

GROUP 7a:Hazardous waste laborer required to wear level A,B,
or C personal protection.

GROUP 7b:Certified laborer working a hazardous waste removal
project or site at a task requiring hazardous waste related
certification, but who is not working in a zone requiring
level A, B or C personal protection.

* LABO0502-001 05/01/2002

	Rates	Fringes
Laborers:		
Group 1.....	\$ 22.95	11.77
Group 2.....	\$ 22.45	11.77
Group 3.....	\$ 19.16	11.77

* LABO0526-001 05/01/2002

	Rates	Fringes
Laborers:		
Group 1.....	\$ 22.95	11.77
Group 2.....	\$ 22.45	11.77
Group 3.....	\$ 19.16	11.77

* LABO0569-001 05/01/2002

	Rates	Fringes
Laborers Building Construction.	\$ 22.95	11.77
CLASS A		

* LABO0694-001 05/01/2002

	Rates	Fringes
Laborers:		
Group 1.....	\$ 22.95	11.77
Group 2.....	\$ 22.45	11.77
Group 3.....	\$ 19.16	11.77

* LABO0711-001 05/01/2002

	Rates	Fringes
Laborers:		
Group 1.....	\$ 22.95	11.77
Group 2.....	\$ 22.45	11.77
Group 3.....	\$ 19.16	11.77

* LABO0779-002 05/01/2002

	Rates	Fringes
Laborers:		
Group 1.....	\$ 22.95	11.77
Group 2.....	\$ 22.45	11.77
Group 3.....	\$ 19.16	11.77

* LABO0913-001 05/01/2002		

	Rates	Fringes
Laborers Building Construction.	\$ 22.95	11.77
Class A Laborer:		

* LABO1030-001 05/01/2004		

	Rates	Fringes
Laborer		
The removal, abatement, enclosure and decontamination of personal protective equipment, chemical protective clothing and machinery relating to asbestos and/or toxic and hazardous waste or materials which shall include but not necessarily be limited to: the erection, moving, servicing and dismantling of all enclosures, scaffolding and barricades; the operation of all tools and equipment normally used in the removal or abatement of asbestos and toxic or hazardous waste or materials; the labeling, bagging, cartoning, crating, or other packaging of materials for disposal; the clean-up of the worksite; and all other work incidental to the removal, abatement, encapsulation, enclosure, and decontamination of asbestos and toxic or hazardous waste or materials; and, in addition, all work tasks involved in the		

maintenance and operation
 of energy resource recovery
 plants (co-generation
 plants).....\$ 23.35 12.11

* PAIN0711-002 05/01/2000

	Rates	Fringes
Painters:		
NEW:		
Bridge.....	\$ 31.25	27% + 2.55
Painters.....	\$ 28.75	27% + 2.55
Paperhangers.....	\$ 28.75	27% + 2.55
Spray,Sandblast,High Work..	\$ 31.25	27% + 2.55
REPAINT:		
Painters.....	\$ 22.00	27% + 2.55
Spray,sandblast,High Work..	\$ 24.00	27% + 2.55

* PAIN0711-003 05/01/2004

	Rates	Fringes
Glazier.....	\$ 31.30	27% + 4.25

* PAIN0711-006 08/01/1999

	Rates	Fringes
Drywall Finisher.....	\$ 28.25	11.23

* PLAS0008-006 05/01/2004

HUNTERDON, MIDDLESEX AND SOMERSET COUNTIES:

	Rates	Fringes
Plasterer.....	\$ 28.35	15.80

* PLAS0029-001 05/01/2003

BERGEN, ESSEX, HUDSON, MORRIS, PASSAIC, SUSSEX, UNION AND WARREN COUNTIES:

	Rates	Fringes
Cement Masons & Plasterers.....	\$ 31.00	12.50

* PLUM0009-001 03/01/2004

	Rates	Fringes
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Air Conditioning &
Refrigeration Mechanic

Installation of
refrigeration equipment
for any type of building
where the combined
compressor tonnage does
not exceed 5 tons;
installation of water-
cooled air conditioning
that does not exceed 10
tons (including the piping
of the component system
and the erection of the
water tower); installation
of air-cooled air
conditioning that does not
exceed 15 tons.....\$ 26.92 11.33 + a

a. Paid Holidays:

New Year's Day, Washington's Birthday, Memorial Day,
Independence Day, Labor Day, Veterans Day, Thanksgiving Day
and Christmas Day.

* PLUM0009-002 07/01/2004

HUNTERDON COUNTY (Township of West Amwell); MIDDLESEX COUNTY
(remainder of county); SOMERSET COUNTY (Townships of Green
Brook and Warren):

	Rates	Fringes
Plumber.....	\$ 38.08	18.80

* PLUM0009-009 07/01/2004

HUNTERDON COUNTY (Township of West Amwell); MIDDLESEX COUNTY
(Townships of Cranbury, East Brunswick, Edison, Monroe, North
Brunswick, Old Bridge, Plainsboro, South Brunswick and
Woodbridge); SOMERSET COUNTY (Townships of Green Brook and
Warren):

	Rates	Fringes
Pipefitter.....	\$ 38.08	18.80

PLUM0014-002 11/01/2003

BERGEN, HUDSON (Bayonne, Guttenberg, Hoboken, Jersey City,
North Bergen, Secaucus, Union City, Weehawken, West New York),
MORRIS (From Mount Olive straight across Randolph down to the
Essex border), PASSAIC, SUSSEX, AND WARREN (Northern half)
COUNTIES

	Rates	Fringes
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Plumber.....\$ 37.56 17.29

PLUM0024-001 05/01/2003

Essex:

HUDSON (East Newark,Harrison,& Kearney only);

HUNTERDON (Alexandria, Alexandria Twp., Alexauken, Allens Corner, Allerton, Amsterdam, Annadale, Anthony, Baptistown, Bellewood, Bethlehem, Twp., Bissell, Bloomsbury, Bunnvale, Bottonwood Corners, Centerville, Charlestown, Cherryville, Clinton, Clinton Twp., Cokebury, Coles Mills, Croton, Delaware Twp., Dilts Corner East Amwell Twp., Everittstown, Fairmount, Farmersville, Franklin Twp., Frenchtown, Glen Gardner, Grandin, Hamden, Hampton, Higginsville, High Bridge, Hoffmans, Holland Twp., Hughesville, Johnsons, Jutland, King, Kingwood Twp., Klinsville, Landsdowne, Lebanon, Lebanon Twp., Little Brook, Little Neck, Little York, Ludlow, McPherson, Milford, Moutainville, Mount Joy, Mount Pleasant, North Salem, Muirshead, New Germantown, New Hampton, Newport, Norton, Oak Grove, Oldwick, Palmyra, Palmyra Corners, Pattenburg, Perryville, Pittstown, Pleasant Run, Polktown, Potterstown, Quakertown, Raritan Twp., Readington, Readington Twp., Reaville, Rileyville, Riverside, Rockafellows, Rowland Mills Sidney, Snyderstown, Spring Mills, Stanton, Stanton Station Sunnyside, Sutton, Tewksbury, Tewksbury Twp.,The Point, Three Bridges, Treasure Island, Tumble, Union, Union Twp., Unionville Van Syckle, Warren Paper Mills, Wertsville, West End, West Portal White House, Whitehouse Station, Woodglen).

MIDDLESEX (Dunellen Borough, East Bound Brook, Middlesex, New Market, Oak Tree, Piscataway Twp., & South Plainfield only).

MORRIS (Bartley, Berkshire Valley, Bertland Island, Brookside, Chatham, Chatham Twp., Chester, Chester Twp., Cooks Bridge, Crestmoore, Gillette, Harding Twp., Ironia, Logansville, Long Valley, Malapardis, Mendham, Mendham Twp., Middle Valley, Millington, Milltown, Milton, Mount Freesom, Mount Olive Twp.,Mount Paul, Myerstown, Maughright, New Vernon, Parker, Passaic Twp, Pleasant Grove, Ralston, Schooleys, Mount Stanley, Stephensonburg, Stirling, & Washint Twp.)

SOMERSET (Amwell, Basking Ridge, Bedminster, Bedminster Twp., Bernards Twp., Bernardsville, Blaziers Corner, Bound Brook, Bradley Gardens, Branchburg Twp., Bridgewater Twp., Burnt Mill, Centerville, Chimney Rock, Claver Hill, Dutchtown, Far Hills Borough, Finderne, Flagstown, Frank Fort, Franklin Park, Franklin Twp., Gallia, Gladstone, Greater Cross Roads, Hamilton, Harmony, Harmony Colony, Higgins Mills, Hillsborough Twp., Lamington, Lanes Crossing, Liberty Corners, Lyons, Madisonville, Manville, Manville Borough, Martinsville, Mettler, Millstone, Mine Brook, Montgomery, Montgomery Twp., Mount Bethel, Mount Horeb, Neshanic, Neshanic Station, North Branch, North Branch Depot, North Plainfield, Peapack,

Peapack-Gladstone, Plainville Plukemin, Pottersville, Raritan, Ravine Lake, Rock Mill, Round Top, Roycefield, Royce Valley, Seeley Mills, Smalleytown, Somerset, Somerville, Stone House, Sunset Lake, Union Village, Vliettown, Watchung, West Millington, Weston, White Bridge, Woodfern, Zarepat, & Zion).

UNION &

WARREN (Anderson, Asbury, Beattystown, Brainards, Brass Castle, Broadway, Buttzville, Carpetersville, Changewater, Cornish, Finesville, Foul Rift, Franklin Twp., Greenwich Twp., Harmony, Harmony Station, Harmony Twp., Haszen, Hope Twp., Hutchinson, Karrville, Kennedy, Lopatcong, Lopatcong Twp., Lower Harmony, Mansfield Twp., Montana, New Village, Oxford, Oxford Twp., Pequest, Pleasant Valley, Port Colden, Port Murray, Riegelsville, Rockport, Rocksbury, Roxburgh, Springtown, Stewartsville, Still Valley, Vulcanite, Warren Glen, Washington, Washington Twp., White Top, & Phillipsburg Twp.)
COUNTIES:

	Rates	Fringes
Plumber (Excludes Somerset-Bldg).....	\$ 37.28	16.45

* PLUM0274-002 05/01/2004		

BERGEN, HUDSON, MORRIS (Remainder), PASSAIC, SUSSEX, AND WARREN (Remainder) COUNTIES

	Rates	Fringes
Pipefitter.....	\$ 38.93	19.07

* PLUM0475-001 05/01/2004		

ESSEX; HUNTERDON (Alexandria, Alexandria Twp, Alexauken, Allens Corner, Allertown, Amsterdam, Annandale, Anthony, Baptistown, Bellewood, Bethlehem Twp, Bissell, Bloomsbury, Bunnvale, Buttonwood Corners, Centerville, Charlestown, Cherryville, Clinton, Cokebury, Coles Mills, Croton, Delaware Twp, Dilts Corner, East Amwell Twp, Evittstown, Fairmount, Farmersville, Franklin Twp, Frenchtown, Glen Gardner, Grandin, Hamden, Hampton, Higginsville, High Bridge, Hoffmans, Holland Twp, Hughesville, Johnsons, Jutland, King, Kingwood Twp, Klinsville, Landsdowne, Lebanon, Lebanon Twp, Little Brooke, Little Neck, Little York, Ludlow, McPherson, Milford, Mountainville, Mount Joy, Mount Pleasant, Mount Salem, Muirshead, New Germantown, New Hampton, Newport, Norton, Oak Grove, Oldwick, Palmyra, Palmyra Corners, Pattenburg, Perryville, Pittstown, Pleasant Run, Polktown, Potterstown, Quakertown, Raritan Twp, Readington Twp); AND WARREN (Phillipsburg Twp) COUNTIES

	Rates	Fringes
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Pipefitter.....\$ 36.91 21.04

ROOF0004-002 06/01/2002

ESSEX; HUDSON (West of the Hackensack River); MIDDLESEX
(Remainder); MORRIS; SOMERSET (Remainder) SUSSEX; UNION; AND
WARREN COUNTIES

	Rates	Fringes
Roofers:		
Roofer, Composition, Damp		
& Waterproofing, Slate & Tile	\$ 29.57	12.75

* ROOF0004-003 12/01/1994

HUNTERDON COUNTY:

	Rates	Fringes
Roofers:		
Shingle, slate and tile.....	\$ 14.25	3.02
All other work.....	\$ 21.95	6.53 + A

FOOTNOTE:

A. Employer contribution of \$509.60 per month per employee
to Health and Welfare Funds.

* ROOF0008-004 07/01/2004

	Rates	Fringes
Roofer.....	\$ 32.08	21.28

* ROOF0010-001 06/01/2004

BERGEN AND PASSAIC COUNTIES

	Rates	Fringes
Mop person.....	\$ 30.40	13.45
Roofer.....	\$ 29.65	13.45

Work operating slag chipping machines, felt laying machines,
power broom machines and adhesive machines:

 New work: \$1.00 per hour additional
 Re-roofing: \$.50 per hour additional

Work operating mechanized equipment (felt-layers, hot
spreaders, slag spreaders) (on new
work only): \$.50 per hour additional.

Work involving the use of pitch, including all tear-offs:
\$1.00 per hour additional.

Work involving asbestos removal: \$1.00 per hour additional.

Work operating adhesive machines on one-ply systems (on new work only): \$.50 per hour additional.

* SFNJ0669-001 01/01/2005

HUNTERDON; MIDDLESEX (Remainder); AND WARREN COUNTIES

	Rates	Fringes
Sprinkler Fitter.....	\$ 35.55	6.20

SFNJ0696-001 07/01/2003

BERGEN, ESSEX, HUDSON, MIDDLESEX (New Brunswick, Milltown, Old Bridge, Browntown and North thereof), MORRIS, PASSAIC, SOMERSET (Bernardsville, Basking Ridge, Mine Brook, Far Hills, Lyons, Mount Bethel, Watchung, North Plainfield Martinville and Somerville), AND UNION COUNTIES

	Rates	Fringes
Sprinkler Fitter.....	\$ 40.45	10.55

SHEE0019-014 06/01/2003

WARREN COUNTY:

	Rates	Fringes
Sheet metal worker.....	\$ 24.57	17.09

SHEE0025-001 06/01/2000

BERGEN, ESSEX, HUDSON, MORRIS, PASSAIC, SOMERSET, SUSSEX, & UNION COUNTIES

	Rates	Fringes
Sheet metal worker.....	\$ 26.92	16.12

SHEE0027-001 01/01/2004

HUNTERDON & MIDDLESEX COUNTIES:

	Rates	Fringes
Sheet metal worker.....	\$ 34.20	21.10

* TEAM0408-001 05/01/1997

ESSEX AND MORRIS COUNTIES; UNION COUNTY (north of Wood Ave.):

	Rates	Fringes
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Truck drivers:

GROUP 1.....	\$ 24.45	7.01 + a + b
GROUP 2.....	\$ 24.50	7.01 + a + b
GROUP 3.....	\$ 24.60	7.01 + a + b
GROUP 4.....	\$ 24.70	7.01 + a + b

Hazardous waste removal:

With suit-up: \$3.00 per hour additional.

Without suit-up: \$1.00 per hour additional.

a. Paid Holidays:

New Year's Day, Washington'd Birthday, Memorial Day, Independence Day, Labor Day, Election Day, Veteran's Day, Thanksgiving Day and Christmas Day, provided the worker has been assigned to work or "shifts" one day of the calendar week during which the holiday falls.

b. Employer contributes \$663.57 per month per worker for health and welfare.

DEFINITION OF GROUPS:

GROUP 1: Driver of the following types of vehicles: straight dump, flat, float, pick-up, container hauler, fuel, water sprinkler, road oil, stringer bead, hot pass, bus, dumpcrete, transit mixer, agitator mixer, half truck, winch truck, side-o-matic, dynamite, powder, x-ray, welding, skid, jeep, station wagon, A-frame, dual purpose truck, truck with mechanical tailgate, asphalt distributor, batch truck, seeding, mulching, fertilizing, air compressor truck (in transit); parts chaser; escort; scissor; hi-lift; telescope; concrete breaker; gin pole; stone, sand, asphalt distributor and spreader; nipper; fuel truck (driver of fuel truck including handling of hose and nozzle - entire unit); team driver; vacuum or vac-all truck (entire unit); skid truck (debris container - entire unit); concrete mobile truck (entire unit); expediter (parts chaser); beltcrete truck; pumpcrete truck; line truck; reel truck; wrecker; utility truck; tack truck; warehouse person; warehouse parts person; yard person; lift truck in warehouse; warehouse clerk; parts person; material checker; receiver; shipper; binning person (materials); cardex person; drivers on the following type of vehicle: Broyhill coal tar epoxy truck, Littleford bituminous distributor, slurry seal truck or vehicle, thiokol track master, pick-up (swamp cat pick-up), bucket loader, dump truck and any rubber-tired tractor used in pulling and towing farm wagons and trailers of any description; off-site and on-site repair shop

GROUP 2: Drivers of straight 3-axle materials truck and float

GROUP 3: Drivers of all Euclid-type vehicles: Euclid, International Harvester, Wabco, Caterpillar, Koehring, tractor and wagon; dumpster; straight, bottom, rear and side dump; carry-all and scraper (not self-loading, loading over the top); water sprinkler trailer; water pull and

similar types of vehicle; driver of tractor and trailer-type vehicles: flat, float, I-beam, low bed, water sprinkler, bituminous transit mix, road oil, fuel, bottom dump hopper, rear dump, office, shanty, epoxy, asphalt, agitator mixer, mulching, stringing, seeding, fertilizing pole, spread, bituminous distributor, water pull (entire unit), tractor trailer, reel trailer and similar types of vehicle

GROUP 4: Winch trailer driver

* TEAM0469-001 05/01/2000

HUNTERDON, MIDDLESEX AND SOMERSET COUNTIES; UNION COUNTY
(south of Wood Ave.); WARREN COUNTY:

	Rates	Fringes
Truck drivers:		
GROUP 1.....	\$ 26.35	11.835 + a + b
GROUP 2.....	\$ 26.40	11.835 + a + b
GROUP 3.....	\$ 26.50	11.835 + a + b
GROUP 4.....	\$ 26.60	11.835 + a + b

Hazardous waste removal: \$3.00 per hour additional.

a. PAID HOLIDAYS:

New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Election Day, Veteran's Day, Thanksgiving Day and Christmas Day, provided that the worker has been assigned to work or "shifts" one day of the calendar week during which the holiday falls.

b. Employer contributes \$400.00 per year per worker for apprenticeship training.

DEFINITION OF GROUPS:

GROUP 1: Driver of the following types of vehicle: straight dump, flat, float, pick-up, container hauler, fuel, water sprinkler, road oil, stringer bead, hot pass, bus, dumpcrete, transit mixer, agitator mixer, half truck, winch truck, side-o-matic, dynamite, powder, x-ray, welding, skid, jeep, station wagon, A-frame, dual purpose truck, truck with mechanical tailgate, asphalt distributor, batch truck, seeding, mulching, fertilizing, air compressor truck (in transit); parts chaser; escort; scissor; hi-lift; telescope; concrete breaker; gin pole; stone, sand, asphalt distributor and spreader; nipper; fuel truck (driver of fuel truck including handling of hose and nozzle - entire unit); team driver; vacuum or vac-all truck (entire unit); skid truck (debris container - entire unit); concrete mobile truck (entire unit); expediter (parts chaser); beltcrete truck; pumpcrete truck; line truck; reel truck; wrecker; utility truck; tack truck; warehouse person; warehouse parts person; yard person; lift truck in

warehouse; driver of the following type vehicles: Broyhill coal tar epoxy truck, Littleford bituminous distributor, slurry seal truck or vehicle, thiokol track master, pick-up (swamp cat pick-up); bucket loader, dump truck and any rubber-tired tractor used in pulling and towing farm wagons and trailers of any description; off-site and on-site repair shop

GROUP 2: Driver of straight 3-axle materials truck and float

GROUP 3: Driver of all Euclid-type vehicles: Euclid, International Harvester, Wabco, Caterpillar, Koehring tractor and wagon; dumpster; straight, bottom, rear and side dump; carry-all and scraper (not self-loading, loading over the top); water sprinkler trailer; water pull and similar types of vehicle; driver of tractor and trailer-type vehicle: flat, float, I-beam, low bed, water sprinkler, bituminous transit mix, road oil, fuel, bottom dump hopper, rear dump, office, shanty, epoxy, asphalt, agitator mixer, mulching, stringing, seeding, fertilizing, pole, spread, bituminous distributor, water pull (entire unit), tractor trailer, reel trailer and similar types of vehicle

GROUP 4: Winch trailer driver

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BERGEN, HUDSON AND PASSAIC COUNTIES

	Rates	Fringes
Truck drivers:		
GROUP 1.....	\$ 24.45	8.08+A
GROUP 2.....	\$ 24.50	8.08+A
GROUP 3.....	\$ 24.60	8.08+A
GROUP 4.....	\$ 24.70	8.08+A

FOOTNOTE:

A. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Presidential Election Day, Veteran's Day, Thanksgiving Day, Christmas Day. \$3.00 per hour premium pay for hazardous work.

TRUCK DRIVERS CLASSIFICATIONS

GROUP 1: Drivers on the following type vehicles: straight dumps, flats, floats, pickups, container haulers, fuel, water sprinkler, road oil, stringer, bead, hot pass, bus dumpcrete, transit mixers, agitator mixer, half truck, winch truck, side-o-matic, dynamite, powder, x-ray, welding, skid, jeep, station wagon, stringer, A-frame, all dual purpose trucks, trucks with mechanical tailgates, asphalt distributor, batch trucks, seeding, mulching, fertilizer, air compressor trucks (in transit), parts chaser, escort, scissor, hi-lift, telescope, concrete

breaker, gin pole, stone, sand, asphalt distributor and spreader, nipper, fuel trucks (drivers on fuel trucks including handling of hose and nozzle - entire unit), team drivers, vacuum or vac-all trucks (entire unit), skid truck (debris container - entire unit), concrete mobile trucks (entire unit), expediter (parts chaser), beltcrete trucks, pumpcrete trucks, line truck, reel truck, wreckers, utility trucks, tack trucks, warehousemen, warehouse parts-men, yardmen, lift truck in warehouse, warehouse clerk, parts man, material checker, receivers, shippers, binning men (materials), cardex man, drivers on the following type vehicles: broyhill coal tar epoxy trucks, little ford bituminous distributor, slurry seal truck or vehicle, thiokol track master pickup (swamp cat pickup); bucket loader truck and any rubber-tired tractor used in pulling and towing farm wagons and trailers of any description, similar type vehicles, off-site and on-site repair shop

GROUP 2: Drivers on straight 3-axle materials: trucks and floats

GROUP 3: Drivers on all euclid type vehicles: euclids, international harvestors, wabcos, caterpillar, keohring, tractors and wagons, dumpsters, straight, bottom, rear and side dumps, carry-alls and scrapers (not self-loading, loading over the top); water sprinkler trailers; water pulls and similar types of vehicles; drivers on tractors and trailer type vehicles: flat, floats, I-beams, low beds, water sprinkler, bituminous transit mix, road oil, fuel, bottom dump hopper, rear dump, office, shanty, epoxy, asphalt, agitator mixer, mulching, stringer, seeding, fertilizing pole, spread, bituminous distributor, water pulls (entire unit) (tractor trailer), reel trailer, and similar types of vehicles

GROUP 4: Winch trailer drivers

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.
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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

In the listing above, the "SU" designation means that rates listed under the identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations

Wage and Hour Division

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

SECTION 08110

STEEL DOORS AND FRAMES

05/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- | | |
|-------------|----------------------------------------------------------------------------------------------------------------|
| ANSI A250.4 | (1994) Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings |
| ANSI A250.6 | (1997) Hardware on Standard Steel Doors (Reinforcement - Application) |
| ANSI A250.8 | (1998) SDI-100 Recommended Specifications for Standard Steel Doors and Frames |

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- | | |
|-------------------|----------------------------------------------------------------------------------------------------------------|
| ASTM A 591 | (1998) Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications |
| ASTM A 653/A 653M | (2000) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process |
| ASTM A 924/A 924M | (1999) General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process |
| ASTM C 578 | (1995) Rigid, Cellular Polystyrene Thermal Insulation |
| ASTM C 591 | (1994) Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation |
| ASTM C 612 | (1993) Mineral Fiber Block and Board Thermal Insulation |
| ASTM D 2863 | (1997) Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index) |

DOOR AND HARDWARE INSTITUTE (DHI)

- | | |
|----------|----------------------------------------------------------------------------------|
| DHI A115 | (1991) Steel Door Preparation Standards (Consisting of A115.1 through A115.6 and |
|----------|----------------------------------------------------------------------------------|

A115.12 through A115.18)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1999) Fire Doors and Fire Windows
NFPA 105	(1999) The Installation of Smoke-Control Door Assemblies
NFPA 252	(1999) Standard Methods of Fire Tests of Door Assemblies

STEEL DOOR INSTITUTE (SDOI)

SDI 105	(1998) Recommended Erection Instructions for Steel Frames
SDI 111-B	Recommended Standard Details for Dutch Doors
SDI 113	(1979) Apparent Thermal Performance of STEEL DOOR and FRAME ASSEMBLIES

UNDERWRITERS LABORATORIES (UL)

UL 10B	(1997) Fire Tests of Door Assemblies
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1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Doors; G, RO

Frames; G, RO

Accessories; G, RO

Weatherstripping; G, RO

Show elevations, construction details, metal gages, hardware provisions, method of glazing, and installation details.

Schedule of doors; G, RO

Schedule of frames; G, RO

Submit door and frame locations.

SD-03 Product Data

Doors; G, RO

Frames; G, RO

Accessories; G, RO

Weatherstripping; G, RO

Submit manufacturer's descriptive literature for doors, frames, and accessories. Include data and details on door construction, panel (internal) reinforcement, insulation, and door edge construction. When "custom hollow metal doors" are provided in lieu of "standard steel doors," provide additional details and data sufficient for comparison to ANSI A250.8 requirements.

SD-04 Samples

Factory-applied enamel finish; G, RO

Where colors are not indicated, submit manufacturer's standard colors and patterns for selection.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver doors, frames, and accessories undamaged and with protective wrappings or packaging. Provide temporary steel spreaders securely fastened to the bottom of each welded frame. Store doors and frames on platforms under cover in clean, dry, ventilated, and accessible locations, with 6 mm airspace between doors. Remove damp or wet packaging immediately and wipe affected surfaces dry. Replace damaged materials with new.

PART 2 PRODUCTS

2.1 STANDARD STEEL DOORS

ANSI A250.8, except as specified otherwise. Prepare doors to receive hardware specified in Section 08710, "Door Hardware." Undercut where indicated. Exterior doors shall have top edge closed flush and sealed to prevent water intrusion. Doors shall be 44.5 mm thick, unless otherwise indicated.

2.1.1 Classification - Level, Performance, Model

2.1.1.1 Standard Duty Doors

ANSI A250.8, Level 1, physical performance Level c, of sizes and designs indicated and core construction as required by the manufacturer. Provide where shown for doors as per door schedule.

2.2 INSULATED STEEL DOOR SYSTEMS

Insulated steel doors shall have a core of polyurethane foam and an R factor of 10.0 or more (based on a k value of 0.16); face sheets, edges, and frames of galvanized steel not lighter than 1.5 mm thick, and 1.5 mm respectively; magnetic weatherstripping; nonremovable-pin hinges; thermal-break aluminum threshold; and vinyl door bottom. Doors and frames shall receive phosphate treatment, rust-inhibitive primer, and painted finish. Doors shall have been tested in accordance with ANSI A250.4 and shall have met the requirements for Level C. Prepare doors to receive hardware specified in Section 08710, "Door Hardware." Doors shall be 44.5 mm thick. Provide insulated steel doors and frames and be as per schedule Exterior Doors

2.3 SOUND RATED STEEL DOORS

Doors shall be of the sound classification scheduled.

2.4 FIRE-RATED STEEL DOORS

Doors shall be of fire rating as per schedule.

2.5 ACCESSORIES

2.5.1 Shelves for Dutch Doors

SDI 111-B. Fabricate shelves of steel not lighter than 1.5 mm thick, 304 mm wide. Brackets shall be stock type fabricated of the same metal used to fabricate shelves.

2.5.2 Astragals

For pairs of exterior steel doors which will not have aluminum astragals or removable mullions, as specified in Section 08710, "Door Hardware," provide overlapping steel astragals with the doors. For interior pairs of doors, provide stainless steel astragals complying with NFPA 105 for smoke control assemblies.

2.5.3 Moldings

Provide moldings around glass of interior and exterior doors and louvers of interior doors. Provide nonremovable moldings on outside of exterior doors and on corridor side of interior doors. Other moldings may be stationary or removable. Secure inside moldings to stationary moldings, or provide snap-on moldings. Muntins shall interlock at intersections and shall be fitted and welded to stationary moldings.

2.6 INSULATION CORES

Insulated cores shall be of type specified, and provide an apparent U-factor of .48 in accordance with SDI 113 and shall conform to:

- a. Rigid Polyurethane Foam: ASTM C 591, Type 1 or 2, foamed-in-place or in board form, with oxygen index of not less than 22 percent when tested in accordance with ASTM D 2863; or
- b. Rigid Polystyrene Foam Board: ASTM C 578, Type I or II; or
- c. Mineral board: ASTM C 612, Type I.

2.7 STANDARD STEEL FRAMES

ANSI A250.8, except as otherwise specified. Form frames to sizes and shapes indicated, with welded corners. Provide steel frames for doors, transoms, sidelights, mullions, cased openings, and interior glazed panels, unless otherwise indicated.

2.7.1 Welded Frames

Continuously weld frame faces at corner joints. Mechanically interlock or continuously weld stops and rabbets. Grind welds smooth.

2.7.2 Mullions and Transom Bars

Mullions and transom bars shall be closed or tubular construction and shall all member with heads and jambs butt-welded thereto. Bottom of door mullions shall have adjustable floor anchors and spreader connections.

2.7.3 Stops and Beads

Form stops and beads from 0.9 mm thick steel. Provide for glazed and other openings in standard steel frames. Secure beads to frames with oval-head, countersunk Phillips self-tapping sheet metal screws or concealed clips and fasteners. Space fasteners approximately 300 to 400 mm on centers. Miter molded shapes at corners. Butt or miter square or rectangular beads at corners.

2.7.4 Cased Openings

Fabricate frames for cased openings of same material, gage, and assembly as specified for metal door frames, except omit door stops and preparation for hardware.

2.7.5 Anchors

Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated or painted with rust-inhibitive paint, not lighter than 1.2 mm thick.

2.7.5.1 Wall Anchors

Provide at least three anchors for each jamb. For frames which are more than 2285 mm in height, provide one additional anchor for each jamb for each additional 760 mm or fraction thereof.

- a. Masonry: Provide anchors of corrugated or perforated steel straps or 5 mm diameter steel wire, adjustable or T-shaped;
- b. Stud partitions: Weld or otherwise securely fasten anchors to backs of frames. Design anchors to be fastened to closed steel studs with sheet metal screws, and to open steel studs by welding];

2.7.5.2 Floor Anchors

Provide floor anchors drilled for 10 mm anchor bolts at bottom of each jamb member. Where floor fill occurs, terminate bottom of frames at the indicated finished floor levels and support by adjustable extension clips resting on and anchored to the structural slabs.

2.8 FIRE DOORS AND FRAMES

NFPA 80 and NFPA 80A and this specification. The requirements of NFPA 80 and NFPA 80A shall take precedence over details indicated or specified.

2.8.1 Labels

Fire doors and frames shall bear the label of Underwriters Laboratories (UL), attesting to the rating required. Testing shall be in accordance with NFPA 252 or UL 10B. Labels shall be metal with raised letters, and shall bear the name or file number of the door and frame manufacturer.

Labels shall be permanently affixed at the factory to frames and to the hinge edge of the door. Door labels shall not be painted.

2.8.2 Oversized Doors

For fire doors and frames which exceed the size for which testing and labeling are available, furnish certificates stating that the doors and frames are identical in design, materials, and construction to a door which has been tested and meets the requirements for the class indicated.

2.8.3 Astragal on Fire Doors

On pairs of labeled fire doors, conform to NFPA 80 and UL requirements.

2.9 WEATHERSTRIPPING

As specified in Section 08710, "Door Hardware."

2.10 HARDWARE PREPARATION

Provide minimum hardware reinforcing gages as specified in ANSI A250.6. Drill and tap doors and frames to receive finish hardware. Prepare doors and frames for hardware in accordance with the applicable requirements of ANSI A250.8 and ANSI A250.6. For additional requirements refer to DHI A115.

Drill and tap for surface-applied hardware at the project site. Build additional reinforcing for surface-applied hardware into the door at the factory. Locate hardware in accordance with the requirements of ANSI A250.8, as applicable. Punch door frames, with the exception of frames that will have weatherstripping or lightproof or soundproof gasketing, to receive a minimum of two rubber or vinyl door silencers on lock side of single doors and one silencer for each leaf at heads of double doors. Set lock strikes out to provide clearance for silencers.

2.11 FINISHES

2.11.1 Factory-Primed Finish

All surfaces of doors and frames shall be thoroughly cleaned, chemically treated and factory primed with a rust inhibiting coating as specified in ANSI A250.8. Where coating is removed by welding, apply touchup of factory primer.

2.11.2 Hot-Dip Zinc-Coated and Factory-Primed Finish

Fabricate exterior doors and frames from hot dipped zinc coated steel, alloyed type, that complies with ASTM A 924/A 924M and ASTM A 653/A 653M. The Coating weight shall meet or exceed the minimum requirements for coatings having 122 grams per square meter, total both sides, i.e., ZF120. Repair damaged zinc-coated surfaces by the application of zinc dust paint. Thoroughly clean and chemically treat to insure maximum paint adhesion. Factory prime as specified in ANSI A250.8.

2.11.3 Electrolytic Zinc-Coated Anchors and Accessories

Provide electrolytically deposited zinc-coated steel in accordance with ASTM A 591, Commercial Quality, Coating Class A. Phosphate treat and factory prime zinc-coated surfaces as specified in ANSI A250.8.

2.12 FABRICATION AND WORKMANSHIP

Finished doors and frames shall be strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Molded members shall be clean cut, straight, and true, with joints coped or mitered, well formed, and in true alignment. Dress exposed welded and soldered joints smooth. Design door frame sections for use with the wall construction indicated. Corner joints shall be well formed and in true alignment. Conceal fastenings where practicable. On wraparound frames for masonry partitions, provide a throat opening 3 mm larger than the actual masonry thickness. Design other frames in exposed masonry walls or partitions to allow sufficient space between the inside back of trim and masonry to receive calking compound.

2.12.1 Grouted Frames

For frames to be installed in exterior walls and to be filled with mortar or grout, fill the stops with strips of rigid insulation to keep the grout out of the stops and to facilitate installation of stop-applied head and jamb seals.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Frames

Set frames in accordance with SDI 105. Plumb, align, and brace securely until permanent anchors are set. Anchor bottoms of frames with expansion bolts or powder-actuated fasteners. Build in or secure wall anchors to adjoining construction. Where frames require ceiling struts or overhead bracing, anchor frames to the struts or bracing. Backfill frames with mortar. When an additive is provided in the mortar, coat inside of frames with corrosion-inhibiting bituminous material. For frames in exterior walls, ensure that stops are filled with rigid insulation before grout is placed.

3.1.2 Doors

Hang doors in accordance with clearances specified in ANSI A250.8. After erection and glazing, clean and adjust hardware.

3.1.3 Fire Doors and Frames

Install fire doors and frames, including hardware, in accordance with NFPA 80. Install fire rated doors and frames in accordance with NFPA 80.

3.2 PROTECTION

Protect doors and frames from damage. Repair damaged doors and frames prior to completion and acceptance of the project or replace with new, as directed. Wire brush rusted frames until rust is removed. Clean thoroughly. Apply an all-over coat of rust-inhibitive paint of the same type used for shop coat.

3.3 CLEANING

Upon completion, clean exposed surfaces of doors and frames thoroughly. Remove mastic smears and other unsightly marks.

3.4 SCHEDULE

Some metric measurements in this section are based on mathematical conversion of inch-pound measurements, and not on metric measurement commonly agreed to by the manufacturers or other parties. The inch-pound and metric measurements are as follows:

<u>PRODUCTS</u>	<u>INCH-POUND</u>	<u>METRIC</u>
Door thickness	1 3/4 inches	44.5 mm
Steel channels	16 gage	1.5 mm
Steel Sheet	23 gage	0.7 mm
	16 gage	1.5 mm
	20 gage	0.9 mm
	18 gage	1.2 mm
Anchor bolts	3/8 inches	10 mm

-- End of Section --

SECTION 08120

ALUMINUM DOORS AND FRAMES

09/99

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 605.2 (1992; Addendum 1995) High Performance Organic Coatings on Architectural Extrusions and Panels

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M (1997; Rev. A) Carbon Structural Steel

ASTM B 209M (1995) Aluminum and Aluminum-Alloy Sheet and Plate (Metric)

ASTM B 221M (1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)

ASTM E 283 (1991) Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

ASTM E 331 (1996) Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

1.2 PERFORMANCE REQUIREMENTS

1.2.1 Structural

Shapes and thicknesses of framing members shall be sufficient to withstand a design wind load of not less than 1.4 kilopascals of supported area or the design wind load indicated with a deflection of not more than 1/60 times the length of the member. Provide glazing beads, moldings, and trim of not less than 1.25 mm nominal thickness. Framing members shall comply with anti-terrorism criteria UDC 4-010-01.

1.2.2 Air Infiltration

When tested in accordance with ASTM E 283, air infiltration shall not exceed 2.63 by 10⁻⁵ cms per square meter of fixed area at a test pressure of 0.30 kPa (80 kilometers per hour wind).

1.2.3 Water Penetration

When tested in accordance with ASTM E 331, there shall be no water penetration at a pressure of 0.38 kPa of fixed area.

1.3 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Doors and frames; G, RO

Show elevations of each door type, size of doors and frames, metal gages, details of door and frame construction, methods of anchorage, glazing details, weatherstripping, provisions for and location of hardware, and details of installation.

SD-08 Manufacturer's Instructions

Doors and frames

Submit detail specifications and instructions for installation, adjustments, cleaning, and maintenance.

1.4 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to the site for damage. Unload and store with minimum handling. Provide storage space in dry location with adequate ventilation, free from dust or water, and easily accessible for inspection and handling. Stack materials on nonabsorptive strips or wood platforms. Do not cover doors and frames with tarps, polyethylene film, or similar coverings. Protect finished surfaces during shipping and handling using manufacturer's standard method, except that no coatings or lacquers shall be applied to surfaces to which calking and glazing compounds must adhere.

PART 2 PRODUCTS

2.1 DOORS AND FRAMES

Swing-type aluminum doors and frames of size, design, and location indicated. Provide doors complete with frames, framing members, subframes, transoms, adjoining sidelights, adjoining window wall, trim, and accessories.

2.2 MATERIALS

2.2.1 Anchors

Stainless steel or steel with hot-dipped galvanized finish. Anchoring must comply with antiterrorism criteria UFC 4-010-01.

2.2.2 Weatherstripping

Continuous wool pile, silicone treated, or type recommended by door manufacturer.

2.2.3 Aluminum Alloy for Doors and Frames

ASTM B 221M, Alloy 6063-T5 for extrusions. ASTM B 209M, alloy and temper best suited for aluminum sheets and strips.

2.2.4 Fasteners

Hard aluminum or stainless steel.

2.2.5 Structural Steel

ASTM A 36/A 36M.

2.2.6 Aluminum Paint

Type as recommended by aluminum door manufacturer.

2.3 FABRICATION

2.3.1 Aluminum Frames

Extruded aluminum shapes with contours approximately as indicated. Provide removable glass stops and glazing beads for frames accommodating fixed glass. Use countersunk stainless steel Phillips screws for exposed fastenings, and space not more than 300 mm o.c. Mill joints in frame members to a hairline fit, reinforce, and secure mechanically. Frames must comply with antiterrorism criteria UFC 4-010-01.

2.3.2 Aluminum Doors

Of type, size, and design indicated and not less than 45 mm thick. Minimum wall thickness, 3 mm, except beads and trim, 1.25 mm. Door sizes shown are nominal and shall include standard clearances as follows: 2.5 mm at hinge and lock stiles, 3 mm between meeting stiles, 3 mm at top rails, 5 mm between bottom and threshold, and 17 mm between bottom and floor. Bevel single-acting doors 2 or 3 mm at lock, hinge, and meeting stile edges. Double-acting doors shall have rounded edges at hinge stile, lock stile, and meeting stile edges.

2.3.2.1 Full Glazed Stile and Rail Doors

Doors shall have narrow stiles and rails as indicated. Fabricate from extruded aluminum hollow seamless tubes or from a combination of open-shaped members interlocked or welded together. Fasten top and bottom rail together by means of welding or by 10 or 13 mm diameter cadmium-plated tensioned steel tie rods. Provide an adjustable mechanism of jack screws or other methods in the top rail to allow for minor clearance adjustments after installation.

2.3.3 Weatherstripping

Provide on stiles and rails of exterior doors. Fit into slots which are integral with doors or frames. Weatherstripping shall be replaceable without special tools, and adjustable at meeting rails of pairs of doors. Installation shall allow doors to swing freely and close positively. Air leakage of a single leaf weatherstripped door shall not exceed 2.19×10^{-5} cubic meter per second of air per square meter of door area when tested in accordance with ASTM E 283.

2.3.4 Anchors

On the backs of subframes, provide anchors of the sizes and shapes indicated for securing subframes to adjacent construction. Anchor transom bars at ends and mullions at head and sill. Reinforce vertical mullions with structural steel members of sufficient length to extend up to the overhead structural slab or framing and secure thereto. Reinforce and anchor freestanding door frames to floor construction as indicated on approved shop drawings and in accordance with manufacturer's recommendation. Place anchors near top and bottom of each jamb and at intermediate points not more than 635 mm apart.

2.3.5 Provisions for Hardware

Hardware is specified in Section 08710, "Door Hardware." Deliver hardware templates and hardware to the door manufacturer for use in fabrication of aluminum doors and frames. Cut, reinforce, drill, and tap doors and frames at the factory to receive template hardware. Provide doors to receive surface-applied hardware, except push plates, kick plates, and mop plates, with reinforcing only; drill and tap in the field. Provide hardware reinforcements of stainless steel or steel with hot-dipped galvanized finish, and secure with stainless steel screws.

2.3.6 Provisions for Glazing

Provide extruded aluminum snap-in glazing beads on interior side of doors. Provide extruded aluminum, theft-proof, snap-in glazing beads or fixed glazing beads on exterior or security side of doors. Glazing beads shall have vinyl insert glazing gaskets. Design glazing beads to receive glass of thickness indicated or specified. Glazing is specified in Section 08800N, "Glazing."

2.3.7 Finishes

Provide exposed aluminum surfaces with factory finish of anodic coating or organic coating.

2.3.7.1 Organic Coating

Clean and prime exposed aluminum surfaces. Provide a high-performance finish in accordance with AAMA 605.2 with total dry film thickness of not less than 0.03 mm. The finish color shall be as indicated.

PART 3 EXECUTION

3.1 INSTALLATION

Plumb, square, level, and align frames and framing members to receive doors adjoining sidelights and adjoining window walls. Anchor frames to adjacent construction as indicated and in accordance with manufacturer's printed instructions. Anchor bottom of each frame to rough floor construction with 2.4 mm thick stainless steel angle clips secured to back of each jamb and to floor construction; use stainless steel bolts and expansion rivets for fastening clip anchors. Seal metal-to-metal joints between framing members as specified in Section 07920N, "Joint Sealants." Hang doors to produce clearances specified by manufacturer. After erection and glazing, adjust doors and hardware to operate properly.

3.2 PROTECTION FROM DISSIMILAR MATERIALS

3.2.1 Dissimilar Metals

Where aluminum surfaces come in contact with metals other than stainless steel, zinc, or small areas of white bronze, protect from direct contact by one or a combination of the following methods:

- a. Paint the dissimilar metal with one coat of heavy-bodied bituminous paint.
- b. Apply a good quality elastomeric sealant between the aluminum and the dissimilar metal.
- c. Paint the dissimilar metal with one coat of primer and one coat of aluminum paint.
- d. Use a nonabsorptive tape or gasket in permanently dry locations.

3.2.2 Drainage from Dissimilar Metals

In locations where drainage from dissimilar metals has direct contact with aluminum, provide protective paint, to prevent aluminum discoloration.

3.2.3 Masonry and Concrete

Provide aluminum surfaces in contact with mortar, concrete, or other masonry materials with one coat of heavy-bodied bituminous paint.

3.2.4 Wood or Other Absorptive Materials

Provide aluminum surfaces in contact with absorptive materials subject to frequent moisture, and aluminum surfaces in contact with treated wood, with two coats of aluminum paint or one coat of heavy-bodied bituminous paint. In lieu of painting the aluminum, the Contractor shall have the option of painting the wood or other absorptive surface with two coats of aluminum paint and sealing the joints with elastomeric sealant.

3.3 CLEANING

Upon completion of installation, clean door and frame surfaces in accordance with door manufacturer's recommended procedure. Do not use abrasive, caustic, or acid cleaning agents.

3.4 PROTECTION

Protect doors and frames from damage and from contamination by other materials such as cement mortar. Prior to completion and acceptance of the work, restore damaged doors and frames to original condition, or replace with new ones.

-- End of Section --

SECTION 08210

WOOD DOORS

09/99

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ARCHITECTURAL WOODWORK INSTITUTE (AWI)

AWI Qual Stds (1997) Architectural Woodwork Quality Standards and Quality Certification Program

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80 (1995) Fire Doors and Fire Windows

WINDOW AND DOOR MANUFACTURERS ASSOCIATION (WDMA)

NWWDA I.S. 1-A (1993) Architectural Wood Flush Doors

NWWDA TM-5 (1990) Split Resistance Test

NWWDA TM-7 (1990) Cycle - Slam Test

NWWDA TM-8 (1990) Hinge Loading Resistance Test

1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Doors; G, RO

Submit drawings or catalog data showing each type of door unit ; descriptive data of head and jamb weatherstripping with installation instructions shall be included. Drawings and data shall indicate door type and construction, sizes, thickness, methods of assembly, door louvers, and glazing,.

SD-03 Product Data

Doors; G, RO

SD-04 Samples

Doors

Prior to the delivery of wood doors, submit a sample section of

each type of door which shows the stile, rail, veneer, finish, and core construction.

Door finish colors; G, RO

Submit a minimum of three color selection samples for selection by the Contracting Officer.

SD-06 Test Reports

Split resistance

Cycle-slam

Hinge loading resistance

Submit split resistance test report for doors tested in accordance with NWWDA TM-5, cycle-slam test report for doors tested in accordance with NWWDA TM-7, and hinge loading resistance test report for doors tested in accordance with NWWDA TM-8.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver doors to the site in an undamaged condition and protect against damage and dampness. Stack doors flat under cover. Support on blocking, a minimum of 100 mm thick, located at each end and at the midpoint of the door. Store doors in a well-ventilated building so that they will not be exposed to excessive moisture, heat, dryness, direct sunlight, or extreme changes of temperature and humidity. Do not store in a building under construction until concrete, masonry work, and plaster are dry. Replace defective or damaged doors with new ones.

1.4 WARRANTY

Warranty shall warrant doors free of defects as set forth in the door manufacturer's door warranty that extends beyond one year.

PART 2 PRODUCTS

2.1 DOORS

Provide doors of the types, sizes, ratings and designs as indicated on drawings.

2.1.1 Flush Doors

Flush doors shall be solid core and shall conform to NWWDA I.S. 1-A, except for the one year acclimatization requirement in paragraph T-2, which shall not apply. Wood doors shall be 5-ply construction with faces, stiles, and rails bonded to the cores.

2.1.1.1 Core Construction

Solid core door construction shall be glued wood block core with vertical and horizontal edges bonded to the core. Blocking and hardware reinforcements for particle board doors shall be blocking option HB 2-5 in accordance with NWWDA I.S. 1-A.

2.1.2 Face Panels

2.1.2.1 Natural Finished Wood Veneer Doors

Veneer doors to receive natural finish shall be Custom Gradde veneer in accordance with NWWDA I.S. 1-A. Vertical stile strips shall be selected to provide edges of the same species and/or color as the veneer. Door finish shall be in accordance with paragraph FINISHING.

2.2 ACCESSORIES

2.2.1 Door Louvers

Fabricate from wood and of sizes indicated. Louvers shall be of the manufacturer's standard design and shall transmit a minimum of 35 percent free air. Louvers shall be the sightproof insert type. Mount louvers in the door as indicated with flush wood moldings. Metal louvers for wood doors are specified in Section 10201N, "Metal Wall and Door Louvers."

2.2.2 Door Light Openings

Provide glazed openings of size as shown on drawings with the manufacturer's standard wood moldings except that moldings for doors to receive natural finish shall be of the same specie and color as the face veneers. Glazing is specified in Section 08800N, "Glazing."

2.2.3 Additional Hardware Reinforcement

Provide fire rated doors with hardware reinforcement blocking. Size of lock blocks shall be as required to secure the hardware specified. Reinforcement blocking shall be in compliance with the manufacturer's labeling requirements and shall not be mineral material similar to the core.

2.3 FABRICATION

2.3.1 Marking

Each door shall bear a stamp, brand, or other identifying mark indicating quality and construction of the door.

2.3.2 Quality and Construction

Identify the standard on which the construction of the door was based and identify doors having a Type I glue bond.

2.3.3 Adhesives and Bonds

NWWDA I.S. 1-A. Use Type II bond for interior doors. Adhesive for doors to receive a natural finish shall be nonstaining.

2.3.4 Finishing

2.3.4.1 Field Painting

Factory prime or seal doors, and field paint as specified in Section 09900, "Paints and Coatings."

2.3.4.2 Factory Finish

Provide doors finished at the factory by the door manufacturer as follows: AWI-02 Qual Stds Section 1500. The coating shall be AWI Qual Stds premium, medium rubbed sheen, open grain effect. Use stain when required to produce the finish specified for color. Seal edges, cutouts, trim, and wood accessories, and apply two coats of finish compatible with the door face finish. Touch-up finishes that are scratched or marred, or where exposed fastener holes are filled, in accordance with the door manufacturer's instructions. Match color and sheen of factory finish using materials compatible for field application.

2.3.4.3 Color

Provide door finish colors as indicated on finish schedule.

PART 3 EXECUTION

3.1 INSTALLATION

Before installation, seal top and bottom edges of doors with the approved water-resistant sealer. Seal cuts made on the job immediately after cutting using approved water-resistant sealer. Fit, trim, and hang doors with a 3 mm maximum clearance at sides and top, and a 6 mm maximum clearance over thresholds. Provide 11 mm maximum clearance at bottom where no threshold occurs. Bevel edges of doors at the rate of 3 mm in 50 mm. Door warp shall not exceed 6 mm when measured in accordance with NWWDA I.S. 1-A.

3.1.1 Fire Doors

Installation, hardware, and operational characteristics shall conform to NFPA 80 and NFPA 101 and shall be in strict conformance with the manufacturer's printed instructions. Properly sized pitot holes shall be drilled for screws in door edges. Factory applied labels shall remain intact where installed. Lockside edge and bottom edge may be trimmed only to the extent recommended by the door manufacturer.

3.2 SCHEDULE

Some metric measurements in this section are based on mathematical conversion of inch-pound measurements, and not on metric measurement commonly agreed to by the manufacturers or other parties. The inch-pound and metric measurements are as follows:

<u>PRODUCTS</u>	<u>INCH- POUND</u>	<u>METRIC</u>
Closet doors	1 1/8 inches	28.5 mm
	1 3/8 inches	35 mm
Weatherstripping	0.0089 inch	0.23 mm
	0.0063 inch	0.16 mm

-- End of Section --

SECTION 08710

DOOR HARDWARE

02/02

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 283 (1991) Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

ASTM F 883 (1990) Padlocks

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

BHMA A156.1 (1997) Butts and Hinges (BHMA 101)

BHMA A156.2 (1996) Bored and Preassembled Locks and Latches (BHMA 601)

BHMA A156.3 (1994) Exit Devices (BHMA 701)

BHMA A156.4 (1992) Door Controls - Closers (BHMA 301)

BHMA A156.5 (1992) Auxiliary Locks & Associated Products (BHMA 501)

BHMA A156.6 (1994) Architectural Door Trim (BHMA 1001)

BHMA A156.7 (1988) Template Hinge Dimensions

BHMA A156.8 (1994) Door Controls - Overhead Holders (BHMA 311)

BHMA A156.13 (1994) Mortise Locks & Latches (BHMA 621)

BHMA A156.15 (1995) Closer Holder Release Devices

BHMA A156.16 (1997) Auxiliary Hardware

BHMA A156.17 (1993) Self Closing Hinges & Pivots

BHMA A156.18 (1993) Materials and Finishes (BHMA 1301)

BHMA A156.21 (1996) Thresholds

BHMA A156.22 (1996) Door Gasketing Systems

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80 (1999) Fire Doors and Fire Windows

NFPA 101 (1997) Life Safety Code

STEEL DOOR INSTITUTE (SDOI)

SDI 100 (1991) Standard Steel Doors and Frames

UNDERWRITERS LABORATORIES (UL)

UL Bldg Mat Dir (1999) Building Materials Directory

UL 14C (1999) Swinging Hardware for Standard
Tin-Clad Fire Doors Mounted Singly and in
Pairs

1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Hardware schedule; G, RO

Keying system

SD-03 Product Data

Hardware items; G, RO

SD-08 Manufacturer's Instructions

Installation

SD-10 Operation and Maintenance Data

Hardware Schedule items, Data Package 1; G, RO

Submit data package in accordance with Section 01781, "Operation and Maintenance Data."

SD-11 Closeout Submittals

Key bitting

1.3 HARDWARE SCHEDULE

Prepare and submit hardware schedule in the following form:

Hard- ware Item	Quan- tity	Size	Reference Publi- cation Type No.	Finish	Mfr. Name and Catalog No.	Key Con- trol Symbols	UL Mark (If fire rated and listed)	BHMA Finish Designa- tion
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1.4 KEY BITTING CHART REQUIREMENTS

Submit key bitting charts to the Contracting Officer prior to completion of the work. Include:

- a. Complete listing of all keys (AA1, AA2, etc.).
- b. Complete listing of all key cuts (AA1-123456, AA2-123458).
- c. Tabulation showing which key fits which door.
- d. Copy of floor plan showing doors and door numbers.
- e. Listing of 20 percent more key cuts than are presently required in each master system.

1.5 QUALITY ASSURANCE

1.5.1 Hardware Manufacturers and Modifications

Provide, as far as feasible, locks, hinges, and closers of one lock, hinge, or closer manufacturer's make. Modify hardware as necessary to provide features indicated or specified.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver hardware in original individual containers, complete with necessary appurtenances including fasteners and instructions. Mark each individual container with item number as shown in hardware schedule. Deliver permanent keys and removable cores to the Contracting Officer. Deliver construction master keys with the locks.

PART 2 PRODUCTS

2.1 TEMPLATE HARDWARE

Hardware to be applied to metal or to prefinished doors shall be made to template. Promptly furnish template information or templates to door and frame manufacturers. Template hinges shall conform to BHMA A156.7. Coordinate hardware items to prevent interference with other hardware.

2.2 HARDWARE FOR FIRE DOORS AND EXIT DOORS

Provide all hardware necessary to meet the requirements of NFPA 80 for fire doors and NFPA 101 for exit doors, as well as to other requirements specified, even if such hardware is not specifically mentioned under paragraph entitled "Hardware Schedule." Swinging hardware for tin-clad fire doors shall conform to UL 14C. Such hardware shall bear the label of Underwriters Laboratories, Inc., and be listed in UL Bldg Mat Dir or labeled and listed by another testing laboratory acceptable to the Contracting Officer.

2.3 HARDWARE ITEMS

Hinges, pivots, locks, latches, exit devices, bolts, and closers shall be clearly and permanently marked with the manufacturer's name or trademark where it will be visible after the item is installed. For closers with covers, the name or trademark may be beneath the cover.

2.3.1 Hinges

BHMA A156.1, 114 by 114 millimeters unless otherwise specified. Construct loose pin hinges for exterior doors and reverse-bevel interior doors so that pins will be nonremovable when door is closed. Other antifriction bearing hinges may be provided in lieu of ball-bearing hinges.

2.3.2 Pivots

BHMA A156.4.

2.3.3 Spring Hinges

BHMA A156.17.

2.3.4 Locks and Latches

2.3.4.1 Mortise Locks and Latches

BHMA A156.13, Series 1000, Operational Grade 1, Security Grade 2. Provide mortise locks with escutcheons not less than 178 by 57 mm with a bushing at least 6 mm long. Cut escutcheons to suit cylinders and provide trim items with straight, beveled, or smoothly rounded sides, corners, and edges. Knobs and roses of mortise locks shall have screwless shanks and no exposed screws.

2.3.4.2 Bored Locks and Latches

BHMA A156.2, Series 4000, Grade 1.

2.3.4.3 Auxiliary Locks

BHMA A156.5, Grade 1.

2.3.4.4 Combination Locks

Heavy-duty, mechanical combination lockset with five pushbuttons, standard-sized knobs, 20 mm deadlocking latch, 70 mm backset. Lock shall be operated by pressing two or more of the buttons in unison or individually in the proper sequence. Inside knob shall always operate the latch. Provide a keyed cylinder on the interior to permit setting the combination.

2.3.4.5 Electro-Mechanical Locks

Electro-mechanical locks shall allow for locking or unlocking of doors from a remote location by means of push buttons. Locks shall be fail-secured mode (exterior side only locked when power is off). Locks shall be mortise series conforming to BHMA A156.13 and bored series conforming to BHMA A156.2 with factory installed electric lock modification or manufactured electro-mechanical locks conforming to BHMA A156.13 or BHMA A156.2 test standards.

2.3.4.6 Electromagnetic Locks

Electromagnetic locks shall allow for locking or unlocking of doors from a remote location by means of push buttons. Electromagnetic locks shall be fail-safe (unlocked when power is off) and shall conform to BHMA A156.23.

2.3.5 Exit Devices

BHMA A156.3, Grade 1. Provide adjustable strikes for rim type and vertical rod devices. Provide open back strikes for pairs of doors with mortise and vertical rod devices. Touch bars may be provided in lieu of conventional crossbars and arms. Provide escutcheons, not less than 178 by 57 mm.

2.3.5.1 Electric Exit Devices

Electric exit devices shall conform to BHMA A156.3 with factory installed electric lock modification having the capability to lock or unlock from remote location by means of push button. Exit devices shall comply with life safety requirements of NFPA 101. In hazardous locations, products shall use safe power supplies.

2.3.6 Exit Locks With Alarm

BHMA A156.5, Type E0431 (with full-width horizontal actuating bar) for single doors; Type E0431 (with actuating bar) or E0471 (with actuating bar and top and bottom bolts, both leaves active) for pairs of doors, unless otherwise specified. Provide terminals for connection to remote indicating panel. Provide outside control key.

2.3.7 Cylinders and Cores

Cylinders and cores shall have seven pin tumblers. Cylinders shall be products of one manufacturer, and cores shall be the products of one manufacturer. Rim cylinders, mortise cylinders, and knobs of bored locksets shall have interchangeable cores which are removable by special control keys. Stamp each interchangeable core with a key control symbol in a concealed place on the core.

2.3.8 Keying System

Provide a grand master keying system. Provide key cabinet as specified.

2.3.9 Lock Trim

Cast, forged, or heavy wrought construction and commercial plain design.

2.3.9.1 Knobs and Roses

In addition to meeting test requirements of BHMA A156.2 and BHMA A156.13, knobs, roses, and escutcheons shall be 1.25 mm thick if unreinforced. If reinforced, outer shell shall be 0.89 mm thick and combined thickness shall be 1.78 mm, except knob shanks shall be 1.52 mm thick.

2.3.9.2 Lever Handles

Provide lever handles in lieu of knobs where specified in paragraph entitled "Hardware Schedule" (Interior doors only). Lever handles for exit devices shall meet the test requirements of BHMA A156.13 for mortise locks.

Lever handle locks shall have a breakaway feature (such as a weakened spindle or a shear key) to prevent irreparable damage to the lock when a force in excess of that specified in BHMA A156.13 is applied to the lever handle. Lever handles shall return to within 13 mm of the door face.

2.3.9.3 Texture

Provide lever handles where specified in paragraph entitled "Hardware Schedule".

2.3.10 Keys

Furnish one file key, one duplicate key, and one working key for each key change and for each master and grand master keying system. Furnish one additional working key for each lock of each keyed-alike group. Furnish 5 great grand master keys, 5 construction master keys, and 5 control keys for removable cores. Furnish a quantity of key blanks equal to 20 percent of the total number of file keys. Stamp each key with appropriate key control symbol and "U.S. property - Do not duplicate." Do not place room number on keys.

2.3.11 Door Bolts

BHMA A156.16. Provide dustproof strikes for bottom bolts, except for doors having metal thresholds. Automatic latching flush bolts: BHMA A156.3, Type 25.

2.3.12 Closers

BHMA A156.4, Series C02000, Grade 1, with PT 4C. Provide with brackets, arms, mounting devices, fasteners, full size covers, except at storefront mounting, and other features necessary for the particular application. Size closers in accordance with manufacturer's recommendations, or provide multi-size closers, Sizes 1 through 6, and list sizes in the Hardware Schedule. Provide manufacturer's 10 year warranty.

2.3.12.1 Identification Marking

Engrave each closer with manufacturer's name or trademark, date of manufacture, and manufacturer's size designation located to be visible after installation.

2.3.13 Overhead Holders

BHMA A156.8.

2.3.14 Closer Holder-Release Devices

BHMA A156.15.

2.3.15 Door Protection Plates

BHMA A156.6.

2.3.15.1 Sizes of Kick Plates

Width for single doors shall be 50 mm less than door width; width for pairs of doors shall be 25 mm less than door width. Height of kick plates shall be [250 mm for flush doors.

2.3.16 Edge Guards

BHMA A156.6, stainless steel, of same height as armor plates. Apply to lock stile.

2.3.17 Door Stops and Silencers

BHMA A156.16. Silencers Type L03011. Provide three silencers for each single door, two for each pair.

2.3.18 Padlocks

ASTM F 883.

2.3.19 Thresholds Material

BHMA A156.21. Use J35100, with vinyl or silicone rubber insert in face of stop, for exterior doors opening out, unless specified otherwise.

2.3.20 Weather Stripping Gasketing

BHMA A156.22. Provide the type and function designation where specified in paragraph entitled "Hardware Schedule". A set shall include head and jamb seals, sweep strips, and for pairs of doors, astragals. Air leakage of weather stripped doors shall not exceed 2.19×10^{-5} cms per minute of air per square meter of door area when tested in accordance with ASTM E 283. Weather stripping shall be one of the following:

2.3.20.1 Extruded Aluminum Retainers

Extruded aluminum retainers not less than 1.25 mm wall thickness with vinyl, neoprene, silicone rubber, or polyurethane inserts. Aluminum shall be anodized.

2.3.20.2 Interlocking Type

Zinc or bronze not less than 0.45 mm thick.

2.3.20.3 Spring Tension Type

Spring bronze or stainless steel not less than 0.20 mm thick.

2.3.21 Lightproofing and Soundproofing Gasketing

BHMA A156.22. A set shall include adjustable doorstops at head and jambs and an automatic door bottom, both of extruded aluminum, clear (natural) bronze anodized, surface applied, with vinyl fin seals between plunger and housing. Doorstops shall have solid neoprene tube, silicone rubber, or closed-cell sponge gasket. Door bottoms shall have adjustable operating rod and silicone rubber or closed-cell sponge neoprene gasket. Doorstops shall be mitered at corners. Provide the type and function designation where specified in paragraph entitled "Hardware Sets".

2.3.22 Rain Drips

Extruded aluminum, not less than 2.03 mm thick, clear anodized. Set drips in sealant conforming to Section 07920N, "Joint Sealants," and fasten with stainless steel screws.

2.3.22.1 Door Rain Drips

Approximately 38 mm high by 16 mm projection. Align bottom with bottom edge of door.

2.3.22.2 Overhead Rain Drips

Approximately 38 mm high by 64 mm projection, with length equal to overall width of door frame. Align bottom with door frame rabbet.

2.3.23 Special Tools

Provide special tools, such as spanner and socket wrenches and dogging keys, required to service and adjust hardware items.

2.3.24 Proximity Card Reader

Card readers shall be capable of real-time monitoring and reporting. The system shall allow for centralized access control and capable to allow changes from one location. Readers shall detect cards at 1 meter distance, be programmable for reporting intrusions, forced entry, door held open, and unauthorized entry. Card reader system shall allow integration with other access technologies, on-line systems and multi-functions cards.

2.4 FASTENERS

Provide fasteners of proper type, quality, size, quantity, and finish with hardware. Fasteners exposed to weather shall be of nonferrous metal or stainless steel. Provide fasteners of type necessary to accomplish a permanent installation.

2.5 FINISHES

BHMA A156.18. Hardware shall have BHMA 630 finish (satin stainless steel), unless specified otherwise. Provide items not manufactured in stainless steel in BHMA 626 finish (satin chromium plated) over brass or bronze. Hinges for exterior doors shall be stainless steel with BHMA 630 finish or chromium plated brass or bronze with BHMA 626 finish. Exit devices shall be provided in BHMA 626 finish in lieu of BHMA 630 finish. Exposed parts of concealed closers shall have finish to match lock and door trim. Hardware for aluminum doors shall be finished to match the doors.

2.6 KEY CABINET AND CONTROL SYSTEM

BHMA A156.5, Type E8331 (25 hooks). Type required to yield a capacity (number of hooks) 50 percent greater than the number of key changes used for door locks.

PART 3 EXECUTION

3.1 INSTALLATION

Install hardware in accordance with manufacturers' printed instructions. Fasten hardware to wood surfaces with full-threaded wood screws or sheet metal screws. Provide machine screws set in expansion shields for fastening hardware to solid concrete and masonry surfaces. Provide toggle bolts where required for fastening to hollow core construction. Provide through bolts where necessary for satisfactory installation.

3.1.1 Weather Stripping Installation

Handle and install weather stripping so as to prevent damage. Provide full contact, weather-tight seals. Doors shall operate without binding.

3.1.1.1 Stop-Applied Weather Stripping

Fasten in place with color-matched sheet metal screws not more than 225 mm o.c. after doors and frames have been finish painted.

3.1.1.2 Interlocking Type Weather Stripping

Provide interlocking, self-adjusting type on heads and jambs and flexible hook type at sills. Nail weather stripping to door 25 mm o.c. and to heads and jambs at 100 mm o.c.

3.1.1.3 Spring Tension Type Weather Stripping

Provide spring tension type on heads and jambs. Provide bronze nails with bronze, stainless steel nails with stainless steel. Space nails not more than 38 mm o.c.

3.1.2 Lightproofing and Soundproofing Installation

Install as specified for stop-applied weather stripping.

3.1.3 Threshold Installation

Extend thresholds the full width of the opening and notch end for jamb stops. Set thresholds in a full bed of sealant and anchor to floor with cadmium-plated, countersunk, steel screws [in expansion sleeves].

3.2 FIRE DOORS AND EXIT DOORS

Install hardware in accordance with NFPA 80 for fire doors, NFPA 101 for exit doors [, and UL 14C for swinging tin-clad fire doors].

3.3 HARDWARE LOCATIONS

SDI 100, unless indicated or specified otherwise.

- a. Kick and Armor Plates: Push side of single-acting doors. Both sides of double-acting doors.
- b. Mop Plates: Bottom flush with bottom of door.

3.4 KEY CABINET AND CONTROL SYSTEM

Locate where directed. Tag one set of file keys and one set of duplicate keys. Place other keys in appropriately marked envelopes, or tag each key. Furnish complete instructions for setup and use of key control system. On tags and envelopes, indicate door and room numbers or master or grand master key.

3.5 FIELD QUALITY CONTROL

After installation, protect hardware from paint, stains, blemishes, and other damage until acceptance of work. Submit notice of testing 15 days before scheduled, so that testing can be witnessed by the Contracting Officer. Adjust hinges, locks, latches, bolts, holders, closers, and other items to operate properly. Demonstrate that permanent keys operate respective locks, and give keys to the Contracting Officer. Correct, repair, and finish, as directed, errors in cutting and fitting and damage

to adjoining work.

3.6 HARDWARE SETS

3.6.1 HW-1

1-1/2 pr.	Hinges, with NRP
1 ea.	Lockset (Mortised), F82, Fin 630 (Lever)
1 ea.	Closer, C02000 with PT4C (painted)
1 set	Silencers, L03011

3.6.2 HW-2

1-1/2 pr.	Hinges, with NRP
1 ea.	Lockset (mortised), F86, Fin 630 (Lever)
1 ea.	Closer
1 set	Silencers, L03011

3.6.3 HW-3

1-1/2 pr.	Hinges, with NRP
1 ea.	Exit device, Fin 630
1 ea.	Closer, C82011 x PT4C
1 set	Silencers

HW-3A

1-1/2 pr.	Hinges, with NRP
1 ea.	Electric exit device
1 ea.	Closer
1 set	Silencers
1 set	Weatherstripping
1 ea.	Card reader

3.6.4 HW-4

1-1/2 pr.	Hinges, with NRP
1 ea.	Lockset (mortised), F75, Fin 630 (Lever)
1 ea.	Closer
1 ea.	Kickplate

3.6.5 HW-5

1-1/2 pr.	Hinges, A8112
1 ea.	Lockset (mortised), F76, Fin 630 (Lever)
1 ea.	Closer, C02000, with PT4C
1 set	Silencers

3.6.6 HW-6 (Not Used)

3.6.7 HW-7

1-1/2 pr.	Hinges, with NRP
1 ea.	Lockset (mortised), (Lever)
1 ea.	Closer
1 set	Silencers
1 ea.	Magnetic latch
1 ea.	Electric exit device
1 ea.	Card reader

1 ea. Door release button

3.6.8 HW-8

1-1/2 pr. Hinges with NRP
1 ea. Closer
1 ea. Lockset (mortised), F86, Fin 630 (Lever)
1 set Weatherstripping
1 set Silencers

3.6.9 HW-9 Coordinate with manufacturer

2 ea. Closers
2 sets Weatherstripping
2 ea. Electric exit device
2 ea. Lockset
2 ea. Magnetic latch
1 ea. Card reader
Hinges by door manufacturer

HW-9A

2 ea. Closers
2 ea. Push/Pull
Hinges by manufacturer

Note: Coordinate all electrical hardware items with electrical contractor.

-- End of Section --

SECTION 11193

DETENTION METAL FRAMES, DOORS, AND DOOR FRAMES

09/99

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 366/A 366M	(1997) Commercial Quality (CS) Steel, Carbon, (0.15 Maximum Percent) Cold-Rolled
ASTM A 569/A 569M	(1997) Commercial Steel (CS) Sheet and Strip, Carbon (0.15 Maximum, Percent), Hot-Rolled
ASTM A 653/A 653M	(1997) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM G 60	(1995) Conducting Cyclic Humidity Tests

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM HMMA 863	(1990) Detention Security Hollow Metal Doors and Frames
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1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Detention hollow metal doors and frames

Submit details at not less than 1/4 full size for each frame type, and elevations of door design type at 1:50 minimum, show conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Indicate fabrication, erection, anchorage, and accessory items.

Submit a schedule listing the location of each door and frame using indicated reference numbers for details and openings shown.

SD-03 Product Data

Detention hollow metal doors and frames

Submit manufacturer's material and fabrication specifications.

SD-06 Test Reports

Door fabrication

Prior to fabrication, submit test report for reinforced flush door of the type to be provided on this project.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver hollow metal work with packaging to provide protection during transit and job storage as recommended by the manufacturer. Door frames shall be provided with steel spreader angles, temporarily attached to the bottom of both jambs, one on each side of the opening to serve as a brace during shipping and handling. Inspect hollow metal work upon delivery for damage. Store hollow metal units on raised platforms in vertical positions with blocking between units to allow air circulation. Keep stored material covered and protected from damage and rust. Do not cover with plastic or unvented canvas.

1.4 HARDWARE COORDINATION CONFERENCE

Conduct a conference for hardware and hollow metal work prior to submittals for the purpose of coordinating the interface of materials that are furnished by the participants listed. Require that a representative of the entity responsible for each of the following functions attend the conference. Notify the following participants a minimum of 5 working days before the conference:

- a. Contractor
- b. Hollow metal supplier and installer
- c. Detention hollow metal supplier and installer
- d. Hardware supplier
- e. Hardware installer
- f. Detention hardware supplier
- g. Detention hardware installer
- h. Remote control operator and locking device supplier and installer
- i. Electrical contractor.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Hot-Rolled Carbon Steel

ASTM A 569/A 569M, commercial quality, 14 gage and thicker.

2.1.2 Cold-Rolled Carbon Steel

ASTM A 366/A 366M, commercial quality, stretcher level sheets, 12 gage.

2.1.3 Galvanized Steel

ASTM A 653/A 653M, CQ, mill phosphatized tested by ASTM G 60.

2.2 DETENTION METAL BAR DOORS AND FRAMES

2.2.1 Door Fabrication

- a. Provide doors fabricated of cold rolled, leveled steel bars with clean smooth surfaces. Gages shall be as indicated on drawings for each type of door. Form molded members straight with joints coped or mitered, and in true alignment. Welded joints on exposed surfaces shall be dressed smooth, to be invisible. Doors shall be custom made full design, to receive detention locks, of the elevations, types and sizes shown on the approved shop drawings and schedules.
- b. Clearances shall be coordinated with frame and in accordance with NAAMM HMMA 863, Part 2, Section 2.02.
- c. Doors shall be free from warpage, wind or buckle. Bends shall be of minimum radius for the gage of metal used.

2.2.2 Door and Frame Fabrication

- a. Custom-made, fully assembled, factory-welded units of the size and shapes shown on the approved shop drawings. Coordinate frame dimension to thickness of door or glass.
- b. Strong, rigid, neat in appearance, and free from defects. Frame members shall be clean cut, straight, and of uniform profile.
- c. Steel channel frames shall provide mitered trim and butted stops. Join head and jamb members by continuous welds occupying the full depth and width of the frame. Grind exposed welds smooth and flush.
- d. Frames shall be installed in masonry partitions with bent rod anchors minimum 150 mm long.
- e. Protect cutouts and reinforcements with pressed steel mortar guards on the inside of the frame.
- f. Floor anchors formed of not less than 3 mm steel shall be securely welded to the bottom of each jamb. Where scheduled, adjustable floor anchors extending not less than 50 mm below the finish floor line shall be provided.
- g. Frames for installation in masonry walls shall be provided with non-removable adjustable jamb anchors constructed of not less than 3 mm material. Provide jamb anchors at 400 mm on center.

2.2.3 Door Hardware

- a. Mortise, reinforce, drill, and tap doors at the factory for mortised hardware in accordance with the approved hardware schedule and templates. Doors to receive surface-mounted hardware shall have inner reinforcing plates for drilling and tapping to be performed in the field.

- b. For detention locks, provide reinforced pocket to receive locks. The secure side of the door shall be finished flush with a 5 mm backup plate to protect lock. Form the pocket perimeter of 12 gage channels on three sides with the door edge bar completing the perimeter frame. Do not cut the door edge channel except for passage of the lock bolt. Provide a 5 mm thick steel mounting and protection plate to cover the lock pocket and extend at least 20 mm on three sides beyond the cutout. Secure the lock to the protection plate in accordance with the lock manufacturer's instructions. Secure the cover plate to the door by at least six 6 mm security-type machine screws. Make provisions so that removal of the lock is impossible when the lock bolt is extended.

2.2.4 Frame Reinforcement for Hardware

- a. Mortise, reinforce, drill, and tap frames at the factory for templated mortised hardware, in accordance with the approved hardware schedules and templates. Frames shall have full height stop on jamb at the strike side.
- b. For each hinge, provide factory welded unit to the channel frame.

2.2.5 Factory Finishing

- a. After fabrication, dress, fill, and sand tool marks and surface imperfections to make faces and vertical edges smooth, level, and free of irregularities.
- b. Surfaces shall be chemically treated and cleansed of rust, oil, and impurities and given a phosphate treatment to ensure paint adhesion.
- c. Paint exposed surfaces of doors, and both inside and outside of frames with a minimum of one-mil thickness of rust inhibitive primer which shall be dried and completely cured to develop hardness before shipment.

2.3 ACCESS PANELS

Provide steel access panels of sizes and locations as indicated and where required for access to utilities, equipment, and controls.

- a. Doors shall be 10 gage steel for interior and 16 gage steel for exterior, flanged 32 mm on four sides, with welded corners.
- b. Frame shall be composed of steel angles measuring 5 by 50 by 50 mm. Weld and grind joints smooth.
- c. Provide detention type hinges with nonremovable pin, three per frame. Weld to door and frames.
- d. Weld steel stop angles measuring 3 by 25 by 25 mm to frame on all four sides.
- e. Masonry anchors shall be welded at factory, 3 by 25 by 150 mm, minimum four per panel. [Provide expansion shields at concrete openings, factory countersunk for 10 mm flathead machine screw, minimum two per jamb.]

- f. Factory finish with prime coat of rust-inhibitive, baked-on enamel.
- g. Provide locks at panels within the security perimeter [and points of egress from ducts and tunnels terminating outside the security perimeter]. Lock case and cover shall be malleable iron and steel. Bolt shall be high strength bronze and project 20 mm from case when retracted and have a throw of not less than 16 mm. Locks shall have five tumblers, each actuated by phosphor bronze springs. Locks shall operate from one side only. Attach to panel with detention type screws. Locks shall be keyed alike. Enter coded keys into keying system as specified in Section 11194, "Detention Hardware."

2.4 OPENING PROVISION

Louvers, view ports shall be manufactured as indicated.

2.5 SOURCE QUALITY CONTROL

Prior to fabrication, perform the following minimum performance test on a 12 gage reinforced flush door of the type to be provided on this project:

- a. Test "A" - Static Load: Under centrally applied load of 62 kN (32 kPa) at quarter points, the maximum permitted deflection shall be 15 mm with a rebound of 0.4 mm after release of load.
- b. Test "B" - Rack Test: Under a concentrated load of 33 kN on one unsupported corner of door, the maximum deflection shall not exceed 90 mm without failure.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Door Schedule

Refer to door schedule on drawings for location of doors, door frames, and door hardware.

3.1.2 Frames

Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After completing wall construction, remove temporary braces and spreaders. Do not use any part of the frame as lintels or load-carrying members. Anchor frame to masonry with flat head security type machine screws into expansion shields or attached to a pre-set rough buck anchored to the masonry in the same way. Install five anchors on each jamb for doors up to and including 2250 mm in height and six on each jamb for taller doors.

3.1.3 Doors

Fit hollow metal doors accurately in frames. Provide metal shims where necessary.

3.1.4 Access Panels

Prepare openings as required to receive frame. Use fasteners as specified

and required by type of surrounding construction. Ensure that frames are properly seated into opening with steel shims and that doors are true, in alignment, and completely flush in appearance. Maintain 3 mm maximum clearance between door and frame.

3.2 ADJUSTMENT AND CLEANING

Remove and replace defective work which is warped, bowed, or otherwise damaged. Adjust hollow metal work for smooth operation. Touch up scratches and bare edges in the field with a rust inhibiting primer prior to painting.

-- End of Section --

SECTION 13080

SEISMIC PROTECTION FOR MISCELLANEOUS EQUIPMENT
09/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASME INTERNATIONAL (ASME)

ASME B18.2.1 (1996) Square and Hex Bolts and Screws, Inch Series

ASME B18.2.2 (1987; R 1999) Square and Hex Nuts

ASTM INTERNATIONAL (ASTM)

ASTM A 153/A 153M (2004) Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A 307 (2004) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

ASTM A 325M (2004b) Structural Bolts, Steel, Heat Treated, 830 Mpa Minimum Tensile Strength (Metric)

ASTM A 36/A 36M (2004) Carbon Structural Steel

ASTM A 500 (2003a) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

ASTM A 53/A 53M (2004a) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASTM A 563M (2004) Carbon and Alloy Steel Nuts (Metric)

ASTM A 572/A 572M (2004) High-Strength Low-Alloy Columbium-Vanadium Structural Steel

ASTM A 603 (1998; R 2003) Zinc-Coated Steel Structural Wire Rope

ASTM A 653/A 653M (2004a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

ASTM E 488 (1996; R 2003) Strength of Anchors in Concrete and Masonry Elements

U.S. ARMY CORPS OF ENGINEERS (USACE)

TI 809-04

(1998) Seismic Design for Buildings

1.2 SYSTEM DESCRIPTION

1.2.1 General Requirements

The requirements for seismic protection measures described in this section shall be applied to the mechanical equipment and systems outlined in Section 15070A SEISMIC PROTECTION FOR MECHANICAL EQUIPMENT, the electrical equipment and systems outlined in Section 16070A SEISMIC PROTECTION FOR ELECTRICAL EQUIPMENT, and the miscellaneous equipment and systems listed below. Seismic protection requirements shall be in accordance with TI 809-04 and additional data furnished by the Contracting Officer, and shall be provided in addition to any other requirements called for in other sections of these specifications. The design for seismic protection shall be based on a Seismic Use Group IIIIE building occupancy and on site response coefficients for $S_{MS} = 0.61g$ and $S_{M1} = 0.22g$. Resistance to lateral forces induced by earthquakes shall be accomplished without consideration of friction resulting from gravity loads. The basic force formulas, for Ground Motions A and B in Chapter 3 of TI 809-04, use the design spectral response acceleration parameters for the performance objective of the building, not for equipment in the building; therefore, corresponding adjustments to the formulas shall be required.

1.2.2 Miscellaneous Equipment and Systems

The bracing for the following miscellaneous equipment and systems shall be developed by the Contractor in accordance with the requirements of this specification:

Storage cabinets	Ornamentations
Storage Racks	Signs and Billboards
Shelving	Furnishings
Partitions	

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Bracing; G, RO
Resilient Vibration Isolation Devices; G, RO
Equipment Requirements; G, RO

Detail drawings along with catalog cuts, templates, and erection and installation details, as appropriate, for the items listed. Submittals shall be complete in detail; shall indicate thickness, type, grade, class of metal, and dimensions; and shall show construction details, reinforcement, anchorage, and installation with relation to the building construction. For equipment and systems in buildings that have a performance objective higher than life-safety, the drawings shall be stamped by the registered

engineer who stamps the calculations required above.

SD-03 Product Data

Bracing; G, RO
Equipment Requirements; G, RO

Copies of the design calculations with the detail drawings. Calculations shall be stamped by a registered engineer and shall verify the capability of structural members to which bracing is attached for carrying the load from the brace.

1.4 EQUIPMENT REQUIREMENTS

1.4.1 Rigidly Mounted Equipment

Items of equipment to be furnished under this contract shall be constructed and assembled to withstand the seismic forces specified in TI 809-04, Chapter 10. For any rigid equipment which is rigidly attached on both sides of a building expansion joint, flexible joints for piping, electrical conduit, etc., that are capable of accommodating displacements equal to the full width of the joint in both orthogonal directions, shall be provided.

1.4.2 Nonrigid or Flexibly-Mounted Equipment

Items of equipment to be furnished shall be constructed and assembled to resist a horizontal lateral force of 2 times the operating weight of the equipment at the vertical center of gravity of the equipment.

PART 2 PRODUCTS

2.1 BOLTS AND NUTS

Squarehead and hexhead bolts, and heavy hexagon nuts, ASME B18.2.1, ASME B18.2.2, or ASTM A 307 for bolts and ASTM A 563M for nuts, ASTM A 325M for bolts and nuts as required. Bolts and nuts used underground and/or exposed to weather shall be galvanized in accordance with ASTM A 153/A 153M.

2.2 SWAY BRACING

Material used for members listed in this section and on the drawings, shall be structural steel conforming with the following:

- a. Plates, rods, and rolled shapes, ASTM A 36/A 36M, ASTM A 572/A 572M, Grade 503. If the Contractor does the design, both ASTM A 36/A 36M and ASTM A 572/A 572M, grade 503 will be allowed.
- b. Wire rope, ASTM A 603.
- c. Tubes, ASTM A 500, Grade B.
- d. Pipes, ASTM A 53/A 53M, Type E or S, Grade B.
- e. Light gauge angles, less than 6 mm thickness, ASTM A 653/A 653M.

PART 3 EXECUTION

3.1 BRACING

Bracing shall conform to the arrangements shown. Trapeze-type hanger shall be secured with not less than two 13 mm bolts.

3.2 BUILDING DRIFT

Sway braces for a piping run shall not be attached to two dissimilar structural elements of a building that may respond differentially during an earthquake unless a flexible joint is provided.

3.3 ANCHOR BOLTS

3.3.1 Cast-In-Place

Floor or pad mounted equipment shall use cast-in-place anchor bolts, except as specified below. Two nuts shall be provided on each bolt. Anchor bolts shall conform to ASTM A 307. Anchor bolts shall have an embedded straight length equal to at least 12 times nominal diameter of the bolt. Anchor bolts that exceed the normal depth of equipment foundation piers or pads shall either extend into concrete floor or the foundation shall be increased in depth to accommodate bolt lengths.

3.3.2 Expansion or Chemically Bonded Anchors

Expansion or chemically bonded anchors shall not be used unless test data in accordance with ASTM E 488 has been provided to verify the adequacy of the specific anchor and application. Expansion or chemically bonded anchors shall not be used to resist pull-out in overhead and wall installations if the adhesive is manufactured with temperature sensitive epoxies and the location is accessible to a building fire. Expansion and chemically bonded anchors shall be installed in accordance with the manufacturer's recommendations. The allowable forces shall be adjusted for the spacing between anchor bolts and the distance between the anchor bolt and the nearest edge, as specified by the manufacturer.

3.3.2.1 General Testing

Expansion and chemically bonded anchors shall be tested in place after installation. The tests shall occur not more than 24 hours after installation of the anchor and shall be conducted by an independent testing agency; testing shall be performed on random anchor bolts as described below.

3.3.2.2 Torque Wrench Testing

Torque wrench testing shall be done on not less than 50] percent of the total installed expansion anchors and at least one anchor for every piece of equipment containing more than two anchors. The test torque shall equal the minimum required installation torque as required by the bolt manufacturer. Torque wrenches shall be calibrated at the beginning of each day the torque tests are performed. Torque wrenches shall be recalibrated for each bolt diameter whenever tests are run on bolts of various diameters. The applied torque shall be between 20 and 100 percent of wrench capacity. The test torque shall be reached within one half turn of the nut, except for 9 mm sleeve anchors which shall reach their torque by

one quarter turn of the nut. If any anchor fails the test, similar anchors not previously tested shall be tested until 20 consecutive anchors pass. Failed anchors shall be retightened and retested to the specified torque; if the anchor still fails the test it shall be replaced.

3.3.2.3 Pullout Testing

Expansion and chemically bonded anchors shall be tested by applying a pullout load using a hydraulic ram attached to the anchor bolt. At least 5 percent of the anchors, but not less than 3 per day shall be tested. The load shall be applied to the anchor without removing the nut; when that is not possible, the nut shall be removed and a threaded coupler shall be installed of the same tightness as the original nut. The test setup shall be checked to verify that the anchor is not restrained from withdrawing by the baseplate, the test fixture, or any other fixtures. The support for the testing apparatus shall be at least 1.5 times the embedment length away from the bolt being tested. Each tested anchor shall be loaded to 1 times the design tension value for the anchor. The anchor shall have no observable movement at the test load. If any anchor fails the test, similar anchors not previously tested shall be tested until 20 consecutive anchors pass. Failed anchors shall be retightened and retested to the specified load; if the anchor still fails the test it shall be replaced.

3.4 RESILIENT VIBRATION ISOLATION DEVICES

Where the need for these devices is determined, based on the magnitude of the design seismic forces, selection of anchor bolts for vibration isolation devices and/or snubbers for equipment base and foundations shall follow the same procedure as in paragraph ANCHOR BOLTS, except that an equipment weight equal to five times the actual equipment weight shall be used.

3.4.1 Resilient and Spring-Type Vibration Devices

Vibration isolation devices shall be selected so that the maximum movement of equipment from the static deflection point shall be 13 mm .

3.4.2 Multidirectional Seismic Snubbers

Multidirectional seismic snubbers employing elastomeric pads shall be installed on floor- or slab-mounted equipment. These snubbers shall provide 6 mm free vertical and horizontal movement from the static deflection point. Snubber medium shall consist of multiple pads of cotton duct and neoprene or other suitable materials arranged around a flanged steel trunnion so both horizontal and vertical forces are resisted by the snubber medium.

3.5 SWAY BRACES FOR PIPING

Transverse sway bracing for steel and copper pipe shall be provided at intervals not to exceed those shown on the drawings. Transverse sway bracing for pipes of materials other than steel and copper shall be provided at intervals not to exceed the hanger spacing as specified in Section 15400A PLUMBING, GENERAL PURPOSE. Bracing shall consist of at least one vertical angle 50 x 50 mm x 16 gauge and one diagonal angle of the same size.

3.5.1 Longitudinal Sway Bracing

Longitudinal sway bracing shall be provided in accordance with Section 15070ASEISMIC CONTROL FOR MECHANICAL EQUIPMENT.

3.5.2 Anchor Rods, Angles, and Bars

Anchor rods, angles, and bars shall be bolted to either pipe clamps or pipe flanges at one end and cast-in-place concrete or masonry insert or clip angles bolted to the steel structure on the other end. Rods shall be solid metal or pipe as specified below. Anchor rods, angles, and bars shall not exceed lengths given in the tabulation below.

3.5.3 Maximum Length for Anchor Braces

Type	Size (millimeters)	Maximum Length* (meters)
Angles	38 x 38 x 6	1.5
	50 x 50 x 6	2.0
	64 x 38 x 6	2.5
	75 x 64 x 6	2.5
	75 x 75 x 6	3.0
Rods	91	1.0
	22	1.0
Flat Bars	38 x 6	0.4
	50 x 6	0.4
	50 x 10	0.5
Pipes (40s)	25	2.0
	32	2.8
	40	3.2
	50	4.0

3.5.4 Bolts

Bolts used for attachment of anchors to pipe and structure shall be not less than 13 mm diameter.

3.6 EQUIPMENT SWAY BRACING

3.6.1 Suspended Equipment and Light Fixtures

Equipment sway bracing shall be provided for items supported from overhead floor or roof structural systems, including light fixtures. Braces shall consist of angles, rods, wire rope, bars, or pipes arranged as shown and secured at both ends with not less than 13 mm bolts. Sufficient braces shall be provided for equipment to resist a horizontal force as specified in Chapter 10 of TI 809-04 without exceeding safe working stress of bracing components. The Contractor shall provide, for approval, specific force calculations in accordance with Chapter 10 of TI 809-04 for the equipment in the project. Details of equipment bracing shall be submitted for acceptance. In lieu of bracing with vertical supports, these items may be supported with hangers inclined at 45 degrees directed up and radially away from equipment and oriented symmetrically in 90-degree intervals on the horizontal plane, bisecting the angles of each corner of the equipment,

provided that supporting members are properly sized to support operating weight of equipment when hangers are inclined at a 45-degree angle.

3.6.2 Floor or Pad Mounted Equipment

3.6.2.1 Shear Resistance

Floor mounted equipment shall be bolted to the floor. Requirements for the number and installation of bolts to resist shear forces shall be in accordance with paragraph ANCHOR BOLTS.

3.6.2.2 Overturning Resistance

The ratio of the overturning moment from seismic forces to the resisting moment due to gravity loads shall be used to determine if overturning forces need to be considered in the sizing of anchor bolts. Calculations shall be provided to verify the adequacy of the anchor bolts for combined shear and overturning.

3.7 SPECIAL INSPECTION AND TESTING FOR SEISMIC-RESISTING SYSTEMS

Special inspections and testing for seismic-resisting systems and components shall be done in accordance with Section 01452 SPECIAL INSPECTION FOR SEISMIC-RESISTING SYSTEMS.

-- End of Section --

SECTION 15995A

COMMISSIONING OF HVAC SYSTEMS

07/03

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Commissioning Team;

List of team members who will represent the Contractor in the pre-commissioning checks and functional performance testing, at least 2 weeks prior to the start of pre-commissioning checks. Proposed revision to the list, prior to the start of the impacted work.

Tests;

Detailed procedures for pre-commissioning checks and functional performance tests, at least 4 weeks prior to the start of pre-commissioning checks.

Pre-Commissioning Checks; G, RO

Schedule for pre-commissioning checks and functional performance tests, at least 2 weeks prior to the start of pre-commissioning checks.

SD-06 Test Reports

Test Reports; G, RO

Completed pre-commissioning checklists and functional performance test checklists organized by system and by subsystem and submitted as one package. The results of failed tests shall be included along with a description of the corrective action taken.

1.2 SEQUENCING AND SCHEDULING

The work described in this Section shall begin only after all work required in related Sections, including Section 15951A DIRECT DIGITAL CONTROL FOR HVAC and Section 15990A TESTING, ADJUSTING, AND BALANCING OF HVAC SYSTEMS, has been successfully completed, and all test and inspection reports and operation and maintenance manuals required in these Sections have been submitted and approved. Seismic details shall be in accordance with Sections 13080 SEISMIC PROTECTION FOR MISCELLANEOUS EQUIPMENT and 15070A

SEISMIC PROTECTION FOR MECHANICAL EQUIPMENT [as indicated]

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 COMMISSIONING TEAM AND CHECKLISTS

The Contractor shall designate team members to participate in the pre-commissioning checks and the functional performance testing specified herein. In addition, the Government will be represented by a representative of the Contracting Officer, the Design Agent's Representative, and the Using Agency. The team members shall be as follows:

Designation	Function
Q	Contractor's Chief Quality Control Representative
M	Contractor's Mechanical Representative
E	Contractor's Electrical Representative
T	Contractor's Testing, Adjusting, and Balancing Representative
C	Contractor's Controls Representative
D	Design Agent's Representative
O	Contracting Officer's Representative
U	Using Agency's Representative

Appendices A and B are provided as a general checklist and have been prepared to best match the various equipment selected during the design of this project. Each checklist shown in Appendices A and B shall be reviewed and modified as necessary to reflect equipment actually installed during construction of the project. The commissioning team shall review the accuracy and applicability of each item in the checklist and revise as needed. Equipment shown in the checklist but not installed for the project shall be annotated as "NA". Likewise, equipment installed but not listed in the checklist shall be added or revised accordingly. A note as to why it was added or revised shall be inserted with the reviewer's initial. The commissioning team shall also add or modify to any of the equipment checklist items as required and/or specified by the equipment manufacturer.

Acceptance by each commissioning team member of each pre-commissioning checklist item shall be indicated by initials and date, unless an "X" is shown indicating that participation by that individual is not required. Acceptance by each commissioning team member of each functional performance test checklist shall be indicated by signature and date.

3.2 TESTS

The pre-commissioning checks and functional performance tests shall be performed in a manner which essentially duplicates the checking, testing, and inspection methods established in the related Sections. Where checking, testing, and inspection methods are not specified in other Sections, methods shall be established which will provide the information required. Testing and verification required by this section shall be performed during the Commissioning phase. Requirements in related Sections are independent from the requirements of this Section and shall not be used to satisfy any of the requirements specified in this Section. The Contractor shall provide all materials, services, and labor required to perform the pre-commissioning checks and functional performance tests. A pre-commissioning check or functional performance test shall be aborted if any system deficiency prevents the successful completion of the test or if

any participating non-Government commissioning team member of which participation is specified is not present for the test. The Contractor shall reimburse the Government for all costs associated with effort lost due to tests that are aborted. These costs shall include salary, travel costs and per diem (where applicable) for Government commissioning team members. The Contractor shall submit Test Reports as specified in the Submittals paragraph.

3.2.1 Pre-Commissioning Checks

Pre-commissioning checks shall be performed for the items indicated on the checklists in Appendix A. Deficiencies discovered during these checks shall be corrected and retested in accordance with the applicable contract requirements.

3.2.2 Functional Performance Tests

Functional performance tests shall be performed for the items indicated on the checklists in Appendix B. Functional performance tests shall begin only after all pre-commissioning checks have been successfully completed. Tests shall prove all modes of the sequences of operation, and shall verify all other relevant contract requirements. Tests shall begin with equipment or components and shall progress through subsystems to complete systems. Upon failure of any functional performance test checklist item, the Contractor shall correct all deficiencies in accordance with the applicable contract requirements. The checklist shall then be repeated until it has been completed with no errors.

APPENDIX A

PRE-COMMISSIONING CHECKLISTS

Pre-commissioning checklist - Piping

For Piping System

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Piping complete.	___	___	X	___	X	___	___	___
b. As-built shop drawings submitted.	___	___	X	___	X	___	___	___
c. Piping flushed and cleaned.	___	___	X	___	X	___	___	___
d. Strainers cleaned.	___	___	X	___	X	___	___	___
e. Valves installed as required.	___	___	X	___	X	___	___	___
f. Piping insulated as required.	___	___	X	___	X	___	___	___
g. Thermometers and gauges installed as required.	___	___	X	___	X	___	___	___
h. Verify operation of valves.	___	___	X	___	___	___	___	___
i. Air vents installed as specified.	___	___	X	X	X	___	___	___
j. Flexible connectors installed as specified	___	___	X	X	X	___	___	___
k. Verify that piping has been labeled and valves identified as specified.	___	___	X	___	___	___	___	___
Testing, Adjusting, and Balancing (TAB)								
a. Hydrostatic test complete.	___	___	X	___	X	___	___	___
b. TAB operation complete.	___	___	X	___	___	___	___	___

Pre-commissioning Checklist - Ductwork

For Air Handler: AHU-1, AHU-2

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Ductwork complete.	___	___	X	___	X	___	___	___
b. As-built shop drawings submitted.	___	___	X	___	X	___	___	___
c. Ductwork leak test complete.	___	___	X	___	X	___	___	___
NOTE: The first bracketed item d will be used for Army projects, the second for Air Force projects.								
[d. Fire dampers, smoke dampers, and access doors installed as required.	___	___	X	___	X	___	___	___]
[d. Fire dampers, smoke dampers, and access doors installed as required with installation of each verified by the specified team members initialing each location on a copy of the as-built drawings.	___	___	X	___	X	___	___	___]
e. Ductwork insulated as required.	___	___	X	___	X	___	___	___
f. Thermometers and gauges installed as required.	___	___	___	___	___	___	___	___
g. Verify open/closed status of dampers.	___	___	X	___	X	___	___	___
h. Verify smoke and fire damper operation.	___	___	X	___	___	___	___	___
i. Flexible connectors installed as specified	___	___	X	___	X	___	___	___
Testing, Adjusting, and Balancing (TAB)								
a. TAB operation complete.	___	___	X	___	X	___	___	___

Pre-commissioning Checklist - DX Air Cooled Condensing Unit

For Condensing Unit: DX-1, DX-2

Checklist Item	Q	M	E	T	C	D	O	U
Installation	___	___	X	X	X	___	___	___
b. Refrigerant pipe leak tested.	___	___	X	X	X	___	___	___
c. Refrigerant pipe evacuated and charged in accordance with manufacturer's instructions.	___	___	X	X	X	___	___	___
d. Check condenser fans for proper rotation.	___	___	X	___	X	___	___	___
e. Any damage to coil fins has been repaired.	___	___	X	___	X	___	___	___
f. Manufacturer's required maintenance/operational clearance provided.	___	___	X	X	X	___	___	___
Electrical								
a. Power available to unit disconnect.	___	___	___	X	X	___	___	___
b. Power available to unit control panel.	___	___	___	X	___	___	___	___
c. Verify that power disconnect is located within sight of the unit it controls	___	___	___	X	___	___	___	___
Controls								
a. Unit safety/protection devices tested.	___	___	X	X	___	___	___	___
b. Control system and interlocks installed.	___	___	X	X	___	___	___	___
c. Control system and interlocks operational.	___	___	X	X	___	___	___	___

Pre-commissioning Checklist - Pumps

For Pump: HWP-1,2; CHWP-1,2; DHWCP-1; SEP-1

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Pumps grouted in place.	___	___	X	X	X	___	___	___
b. Pump vibration isolation devices functional.	___	___	X	X	X	___	___	___
c. Pump/motor coupling alignment verified.	___	___	X	X	X	___	___	___
d. Piping system installed.	___	___	X	X	X	___	___	___
e. Piping system pressure tested.	___	___	X	X	X	___	___	___
f. Pump not leaking.	___	___	X	X	X	___	___	___
g. Field assembled couplings aligned to meet manufacturer's prescribed tolerances.	___	___	X	X	X	___	___	___
Electrical								
a. Power available to pump disconnect.	___	___	___	X	X	___	___	___
b. Pump rotation verified.	___	___	___	X	X	___	___	___
c. Control system interlocks functional.	___	___	___	X	___	___	___	___
d. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___
Testing, Adjusting, and Balancing (TAB)								
a. Pressure/temperature gauges installed.	___	___	X	___	X	___	___	___
b. Piping system cleaned.	___	___	X	X	X	___	___	___
c. Chemical water treatment complete.	___	___	X	X	X	___	___	___
d. Water balance complete.	___	___	X	___	X	___	___	___
e. Water balance with design maximum flow.	___	___	X	___	X	___	___	___
f. TAB Report submitted.	___	___	X	___	X	___	___	___

Pre-commissioning Checklist - Packaged Air Cooled Chiller

For Chiller: CH-1

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Chiller properly piped.	___	___	X	___	___	___	___	___
b. Chilled water pipe leak tested.	___	___	X	X	X	___	___	___
c. Verify that refrigerant used complies with specified requirements.	___	___	X	X	X	___	___	___
d. Any damage to coil fins has been repaired.	___	___	X	___	X	___	___	___
e. Manufacturer's required maintenance clearance provided.	___	___	X	X	X	___	___	___
Electrical								
a. Power available to unit disconnect.	___	___	___	X	___	___	___	___
b. Power available to unit control panel.	___	___	___	X	___	___	___	___
c. Separate power is supplied to electric heating tape.	___	___	___	X	___	___	___	___
d. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___
Controls								
a. Factory startup and checkout complete.	___	___	X	X	___	___	___	___
b. Chiller safety/protection devices tested.	___	___	X	X	___	___	___	___
c. Chilled water flow switch installed.	___	___	X	X	___	___	___	___
d. Chilled water flow switch tested.	___	___	X	X	___	___	___	___
e. Chilled water pump interlock installed.	___	___	X	X	X	___	___	___
f. Chilled water pump interlock tested.	___	___	___	X	___	___	___	___

Pre-commissioning Checklist - Hot Water Boiler

For Boiler: B-1

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Boiler flue installed.	___	___	X	___	___	___	___	___
b. Boiler hot water piping installed.	___	___	X	___	___	___	___	___
c. Boiler hot water piping tested.	___	___	X	X	___	___	___	___
d. Boiler makeup water piping installed.	___	___	X	___	___	___	___	___
e. Boiler fuel oil piping installed.	___	___	X	X	X	___	___	___
f. Boiler fuel oil piping tested.	___	___	X	X	X	___	___	___
g. Boiler gas piping installed.	___	___	X	X	X	___	___	___
h. Boiler gas piping tested.	___	___	X	X	X	___	___	___
i. Manufacturer's required maintenance clearance provided.	___	___	X	___	___	___	___	___
Startup								
a. Boiler system cleaned and filled with treated water.	___	___	X	___	___	___	___	___
b. Boiler safety/protection devices, including high temperature burner shut-off, low water cutoff, flame failure, pre and post purge, have been tested.	___	___	___	X	___	___	___	___
c. Verify that PRV rating conforms to boiler rating.	___	___	___	X	___	___	___	___
d. Boiler water treatment system functional.	___	___	X	X	___	___	___	___
e. Boiler startup and checkout complete.	___	___	X	X	___	___	___	___
f. Combustion efficiency demonstrated.	___	___	X	___	X	___	___	___
Electrical								
a. Verify that power disconnect is located within sight of the unit served.	___	___	___	X	___	___	___	___
Controls								
a. Hot water pump interlock installed.	___	___	___	X	___	___	___	___
b. Hot water pump interlock tested.	___	___	___	X	___	___	___	___
c. Hot water heating system balanced.	___	___	X	X	___	___	___	___
d. Hot water heating controls operational.	___	___	X	X	___	___	___	___

Pre-commissioning Checklist - Fan Coil Unit

For Fan Coil Unit: All

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Vibration isolation devices installed.	___	___	X	X	X	___	___	___
b. Access doors/removable panels are operable and sealed.	___	___	X	___	X	___	___	___
c. Casing undamaged.	___	___	X	X	X	___	___	___
d. Insulation undamaged.	___	___	X	X	X	___	___	___
e. Condensate drainage is unobstructed.	___	___	X	X	X	___	___	___
f. Fan belt adjusted.	___	___	X	___	X	___	___	___
g. Any damage to coil fins has been repaired.	___	___	X	___	X	___	___	___
h. Manufacturer's required maintenance clearance provided.	___	___	X	X	X	___	___	___
Electrical								
a. Power available to unit disconnect.	___	___	___	X	___	___	___	___
b. Power available to unit control panel.	___	___	___	X	___	___	___	___
c. Proper motor rotation verified.	___	___	___	___	X	___	___	___
d. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___
[e. Power available to electric heating coil.	___	___	___	X	X	___	___	___]
Coils								
[a. Dual temperature piping properly connected.	___	___	X	___	___	___	___	___]
[a. Chilled water piping properly connected.	___	___	X	X	X	___	___	___]
[b. Dual temperature piping pressure tested.	___	___	X	___	___	___	___	___]
[b. Chilled water piping pressure tested.	___	___	X	X	X	___	___	___]
[c. Hot water piping properly connected.	___	___	X	___	___	___	___	___]
[d. Hot water piping pressure tested.	___	___	X	___	___	___	___	___]
Controls								
a. Control valves/actuators properly installed.	___	___	X	___	___	___	___	___

Pre-commissioning Checklist - Fan Coil Unit

For Fan Coil Unit: All

Checklist Item	Q	M	E	T	C	D	O	U
b. Control valves/actuators operable.	___	___	X	X	___	___	___	___
c. Verify proper location and installation of thermostat.	___	___	X	___	___	___	___	___
Testing, Adjusting, and Balancing (TAB)								
a. Construction filters removed and replaced.	___	___	X	___	___	___	___	___
b. TAB results within limits specified in Section 15990A								
c. TAB Report submitted.	___	___	X	___	X	___	___	___

Pre-commissioning Checklist - Unit Heater

For Unit Heater: All

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
[a. Hot water piping properly connected.	___	___	X	___	___	___	___	___]
[a. Steam and condensate piping properly connected.	___	___	X	X	X	___	___	___]
[b. Hot water piping pressure tested.	___	___	X	___	___	___	___	___]
[b. Steam and condensate piping pressure tested.	___	___	X	X	X	___	___	___]
c. Air vent installed on hot water coil with shutoff valve as specified.	___	___	X	X	X	___	___	___
d. Any damage to coil fins has been repaired.	___	___	X	___	X	___	___	___
e. Manufacturer's required maintenance/operational clearance provided.	___	___	X	X	X	___	___	___
Electrical								
a. Power available to unit disconnect.	___	___	___	X	___	___	___	___
b. Proper motor rotation verified.	___	___	___	X	X	___	___	___
c. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___
d. Power available to electric heating coil.	___	___	___	X	___	___	___	___
Controls								
a. Control valves properly installed.	___	___	X	___	___	___	___	___
b. Control valves operable.	___	___	X	X	___	___	___	___
c. Verify proper location and installation of thermostat.	___	___	X	___	___	___	___	___
Testing, Adjusting, and Balancing (TAB)								
a. TAB Report submitted.	___	___	X	___	X	___	___	___

Pre-commissioning Checklist - Exhaust Fan

For Exhaust Fan: EF-1, 2, 3, 4, 5, 6, 7, SF-1

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Fan belt adjusted.	___	___	X	___	X	___	___	___
Electrical								
a. Power available to fan disconnect.	___	___	___	X	___	___	___	___
b. Proper motor rotation verified.	___	___	___	___	X	___	___	___
c. Verify that power disconnect is located within sight of the unit it controls.	___	___	___	X	___	___	___	___
Controls								
a. Control interlocks properly installed.	___	___	___	X	___	___	___	___
b. Control interlocks operable.	___	___	___	X	___	___	___	___
c. Dampers/actuators properly installed.	___	___	X	___	___	___	___	___
d. Dampers/actuators operable.	___	___	X	___	___	___	___	___
e. Verify proper location and installation of thermostat.	___	___	X	___	___	___	___	___
Testing, Adjusting, and Balancing (TAB)								
a. TAB results within limits specified in Section 15990A	___	___	X	___	X	___	___	___
b. TAB Report submitted.	___	___	X	___	X	___	___	___

Pre-commissioning Checklist - HVAC System Controls

For HVAC System: All

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. As-built shop drawings submitted.	___	___	X	X	___	___	___	___
b. Layout of control panel matches drawings.	___	___	X	X	___	___	___	___
c. Framed instructions mounted in or near control panel.	___	___	X	X	___	___	___	___
d. Components properly labeled (on inside and outside of panel).	___	___	X	X	___	___	___	___
e. Control components piped and/or wired to each labeled terminal strip.	___	___	X	X	___	___	___	___
f. EMCS connection made to each labeled terminal strip as shown.	___	___	X	X	___	___	___	___
g. Control wiring and tubing labeled at all terminations, splices, and junctions.	___	___	X	X	___	___	___	___
h. Shielded wiring used on electronic sensors.	___	___	X	X	___	___	___	___
i. Air dryer installed as specified.	___	___	X	X	___	___	___	___
j. Water drain installed as specified.	___	___	X	X	___	___	___	___
Main Power and Control Air								
a. 110 volt AC power available to panel.	___	___	___	X	___	___	___	___
b. 138 kPa gauge (20 psig) compressed air available to panel.	___	___	X	X	___	___	___	___
Testing, Commissioning, and Balancing								
a. Testing, Commissioning, and Balancing Report submitted.	___	___	X	___	___	___	___	___

Pre-commissioning Checklist - Single Zone Air Handling Unit

For Air Handling Unit: AHU-1, AHU-2

Checklist Item	Q	M	E	T	C	D	O	U
Installation								
a. Vibration isolation devices installed.	__	__	X	X	X	__	__	__
b. Inspection and access doors are operable and sealed.	__	__	X	__	X	__	__	__
c. Casing undamaged.	__	__	X	X	X	__	__	__
d. Insulation undamaged.	__	__	X	X	X	__	__	__
e. Condensate drainage is unobstructed.	__	__	X	X	X	__	__	__
f. Fan belt adjusted.	__	__	X	__	X	__	__	__
g. Any damage to coil fins has been repaired.	__	__	X	__	X	__	__	__
h. Manufacturer's required maintenance clearance provided.	__	__	X	X	X	__	__	__
Electrical								
a. Power available to unit disconnect.	__	__	__	X	X	__	__	__
b. Power available to unit control panel.	__	__	__	X	__	__	__	__
c. Proper motor rotation verified.	__	__	__	__	X	__	__	__
d. Verify that power disconnect is located within sight of the unit it controls.	__	__	__	X	__	__	__	__
e. Power available to electric heating coil.	__	__	__	X	__	__	__	__
Coils								
[a. Chilled water piping properly connected.	__	__	X	__	__	__	__	__]
[a. Refrigerant piping properly connected.	__	__	X	X	X	__	__	__]
[b. Chilled water piping pressure tested.	__	__	X	X	X	__	__	__]
[b. Refrigerant piping pressure tested.	__	__	X	X	X	__	__	__]
[c. Hot water piping properly connected.	__	__	X	__	__	__	__	__]
[c. Steam and condensate piping properly connected.	__	__	X	X	X	__	__	__]
[d. Hot water piping pressure tested.	__	__	X	X	__	__	__	__]

Pre-commissioning Checklist - Single Zone Air Handling Unit

Pre-commissioning Checklist - Single Zone Air Handling Unit

For Air Handling Unit: AHU-1, AHU-2

Checklist Item	Q	M	E	T	C	D	O	U
For Air Handling Unit: AHU-1, AHU-2								
[d. Steam and condensate piping pressure tested.	___	___	X	X	X	___	___	___]
[e. Air vents installed on water coils [with shutoff valves] as specified.	___	___	X	X	X	___	___	___]
f. Any damage to coil fins has been repaired.	___	___	X	___	X	___	___	___
Controls								
a. Control valves/actuators properly installed.	___	___	X	___	___	___	___	___
b. Control valves/actuators operable.	___	___	X	___	___	___	___	___
c. Dampers/actuators properly installed.	___	___	X	___	___	___	___	___
d. Dampers/actuators operable.	___	___	X	___	___	___	___	___
e. Verify proper location and installation of thermostat.	___	___	X	___	___	___	___	___
Testing, Adjusting, and Balancing (TAB)								
a. Construction filters removed and replaced.	___	___	X	___	X	___	___	___
b. TAB results within limits specified in Section 15990A	___	___	X	___	X	___	___	___
c. TAB Report submitted.	___	___	X	___	X	___	___	___

APPENDIX B

FUNCTIONAL PERFORMANCE TESTS CHECKLISTS

Functional Performance Test Checklist - Pumps

For Pump: HWP-1,2; CHWP-1,2; DHWCP-1; SEP-1

Prior to performing this checklist, ensure that for closed loop systems, system is pressurized and the make-up water system is operational or, for open loop systems, that the sumps are filled to the proper level.

1. Activate pump start using control system commands (all possible combination, on/auto, etc.). ON _____ AUTO _____ OFF _____

a. Verify pressure drop across strainer:

Strainer inlet pressure _____ kPa (____ psig)
Strainer outlet pressure _____ kPa (____ psig)

b. Verify pump inlet/outlet pressure reading, compare to Testing, Adjusting, and Balancing (TAB) Report, pump design conditions, and pump manufacturer's performance.

	DESIGN	SYSTEM TEST	ACTUAL
Pump inlet pressure (kPa gauge)	_____	_____	_____
Pump outlet pressure (kPa gauge)	_____	_____	_____

c. Operate pump at shutoff and at 100 percent of designed flow when all components are in full flow. Plot test readings on pump curve and compare results against readings taken from flow measuring devices.

	SHUTOFF	100 percent
Pump inlet pressure (kPa gauge)	_____	_____
Pump outlet pressure	_____	_____
Pump flow rate (L/s)	_____	_____

d. Operate pump at shutoff and at minimum flow or when all components are in full by-pass. Plot test readings on pump curve and compare results against readings taken from flow measuring devices.

	SHUTOFF	100 percent
Pump inlet pressure (kPa gauge)	_____	_____
Pump outlet pressure	_____	_____
Pump flow rate (L/s)	_____	_____

	SHUTOFF	100 percent
Pump inlet pressure (kPa gauge)	_____	_____
Pump outlet pressure	_____	_____
Pump flow rate (L/s)	_____	_____

2. Verify motor amperage each phase and voltage phase to phase and phase to ground for both the full flow and the minimum flow conditions.

a. Full flow:

	PHASE 1	PHASE 2	PHASE 3
Amperage	_____	_____	_____
Voltage	_____	_____	_____

Functional Performance Test Checklist - Pumps

For Pump: HWP-1,2; CHWP-1,2; DHWCP-1; SEP-1

Voltage

Voltage to ground

b. Minimum flow:

PHASE 1

PHASE 2

PHASE 3

Amperage

Voltage

Voltage

Voltage to ground

3. Unusual vibration, noise, etc.

4. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

Signature and Date

Contractor's Chief Quality Control Representative

Contractor's Mechanical Representative

Contractor's Electrical Representative

Contractor's Testing, Adjusting and Balancing Representative

Contractor's Controls Representative

Contracting Officer's Representative

Using Agency's Representative

Functional Performance Test Checklist - Single Zone Air Handling Unit

For Air Handling Unit: AHU-1, AHU-2

1. Functional Performance Test: Contractor shall verify operation of air handling unit as per specification including the following:

a. The following shall be verified when the [supply fan operating] [supply and return fans operating] mode is initiated:

(1) All dampers in normal position. _____

(2) All valves in normal position. _____

(3) System safeties allow start if safety conditions are met. _____

b. Occupied mode of operation - economizer de-energized.

(1) Outside air damper at minimum position. _____

(2) Return air damper open. _____

(3) Relief air damper [at minimum position] [closed]. _____

(4) Chilled water control valve modulating to maintain space cooling temperature set point. _____

(5) Hot water control valve modulating to maintain space heating temperature set point input from outside air temperature controller. _____

c. Occupied mode of operation - economizer energized.

(1) Outside air damper modulated to maintain mixed air temperature set point. _____

(2) Relief air damper modulates with outside air damper according to sequence of operation. _____

(3) Chilled water control valve modulating to maintain space cooling temperature set point. _____

d. Unoccupied mode of operation

(1) All dampers in normal position. _____

(2) Verify low limit space temperature is maintained as specified in sequence of operation. _____

e. The following shall be verified when the [supply fan off] [supply and return fans off] mode is initiated:

(1) All dampers in normal position. _____

(2) All valves in normal position. _____

(3) Fan de-energizes. _____

f. Verify cooling coil and heating coil operation by varying thermostat set point from cooling set point to heating set point and

returning to cooling set point. _____

g. Verify safety shut down initiated by smoke detectors. _____

h. Verify safety shut down initiated by low temperature protection thermostat. _____

2. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

Signature and Date

Contractor's Chief Quality Control Representative

Contractor's Mechanical Representative

Contractor's Electrical Representative

Contractor's Testing, Adjusting and Balancing Representative

Contractor's Controls Representative

Contracting Officer's Representative

Using Agency's Representative

Functional Performance Test Checklist - Packaged Air Cooled Chiller

For Chiller: CH-1

1. Functional Performance Test: Contractor shall demonstrate operation of chilled water system as per specifications including the following: Start building air handler to provide load for chiller. Activate controls system chiller start sequence as follows.

a. Start chilled water pump and establish chilled water flow. Verify chiller-chilled water proof-of-flow switch operation. _____

b. Verify control system energizes chiller start sequence. _____

c. Verify chiller senses chilled water temperature above set point and control system activates chiller start. _____

d. Verify functioning of "soft start" sequence. _____

e. Shut off air handling equipment to remove load on chilled water system. Verify chiller shutdown sequence is initiated and accomplished after load is removed. _____

f. Restart air handling equipment one minute after chiller shut down. Verify chiller restart sequence. _____

2. Verify chiller inlet/outlet pressure reading, compare to Testing, Adjusting, and Balancing (TAB) Report, chiller design conditions, and chiller manufacturer's performance data.

	DESIGN	SYSTEM TEST	ACTUAL
Chiller inlet pressure (kPa gauge)	_____	_____	_____
Chiller outlet pressure (kPa gauge)	_____	_____	_____

3. Verify chiller amperage each phase and voltage phase-to-phase and phase-to-ground.

	PHASE 1	PHASE 2	PHASE 3
Amperage	_____	_____	_____
Voltage	_____	_____	_____
Voltage	_____	_____	_____
Voltage to ground	_____	_____	_____

4. Record the following information:

Ambient dry bulb temperature _____ degrees C
 Ambient wet bulb temperature _____ degrees C
 Entering chilled water temperature _____ degrees C
 Leaving chilled water temperature _____ degrees C

5. Unusual vibration, noise, etc.

Functional Performance Test Checklist - Packaged Air Cooled Chiller

For Chiller: CH-1

6. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

Signature and Date

Contractor's Chief Quality Control Representative

Contractor's Mechanical Representative

Contractor's Electrical Representative

Contractor's Testing, Adjusting and Balancing Representative

Contractor's Controls Representative

Contracting Officer's Representative

Using Agency's Representative

Functional Performance Test Checklist - Air Cooled Condensing Unit

For Condensing Unit: DX-1, DX-2

1. Functional Performance Test: Contractor shall demonstrate operation of refrigeration system as per specifications including the following: Start building air handler to provide load for condensing unit. Activate controls system start sequence as follows.

a. Start air handling unit. Verify control system energizes condensing unit start sequence. _____

b. Shut off air handling equipment to verify condensing unit de-energizes. _____

c. Restart air handling equipment one minute after condensing unit shut down. Verify condensing unit restart sequence. _____

2. Verify condensing unit amperage each phase and voltage phase to phase and phase to ground.

	PHASE 1	PHASE 2	PHASE 3
Amperage	_____	_____	_____
Voltage	_____	_____	_____
Voltage	_____	_____	_____
Voltage to ground	_____	_____	_____

3. Record the following information:

Ambient dry bulb temperature	_____	degrees C
Ambient wet bulb temperature	_____	degrees C
Suction pressure	_____	kPa gauge
Discharge pressure	_____	kPa gauge

4. Unusual vibration, noise, etc.

5. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

Signature and Date

Contractor's Chief Quality Control Representative

Contractor's Mechanical Representative

Contractor's Electrical Representative Representative

Contractor's Testing, Adjusting and Balancing

Functional Performance Test Checklist - Air Cooled Condensing Unit

For Condensing Unit: DX-1, DX-2

Contractor's Controls Representative

Contracting Officer's Representative

Using Agency's Representative

Functional Performance Test Checklist - Hot Water Boiler

For Boiler: B-1

1. Functional Performance Test: Contractor shall demonstrate operation of hot water system as per specifications including the following: Start building heating equipment to provide load for boiler. Activate controls system boiler start sequence as follows.

a. Start hot water pump and establish hot water flow. Verify boiler hot water proof-of-flow switch operation. _____

b. Verify control system energizes boiler start sequence. _____

c. Verify boiler senses hot water temperature below set point and control system activates boiler start. _____

d. Shut off building heating equipment to remove load on hot water system. Verify boiler shutdown sequence is initiated and accomplished after load is removed. _____

2. Verify boiler inlet/outlet pressure reading, compare to Test and Balance (TAB) Report, boiler design conditions, and boiler manufacturer's performance data.

	DESIGN	SYSTEM TEST	ACTUAL
Boiler inlet pressure (kPa gauge)	_____	_____	_____
Boiler outlet pressure (kPa gauge)	_____	_____	_____
Boiler flow rate (L/s)	_____	_____	_____
Flue-gas temperature at boiler outlet		_____	_____
Percent carbon dioxide in flue-gas		_____	_____
Draft at boiler flue-gas exit		_____	_____
Draft or pressure in furnace		_____	_____
Stack emission pollutants concentration	_____	_____	_____
Fuel type	_____	_____	_____
Combustion efficiency	_____	_____	_____

3. Record the following information:

Ambient temperature	_____	degrees C
Entering hot water temperature	_____	degrees C
Leaving hot water temperature	_____	degrees C

4. Verify temperatures in item 3 are in accordance with the reset schedule. _____

5. Verify proper operation of boiler safeties. _____

6. Unusual vibration, noise, etc. _____

Functional Performance Test Checklist - Hot Water Boiler

For Boiler: B-1

7. Visually check refractory for cracks or spalling and refractory and tubes for flame impingement.

8. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

Signature and Date

Contractor's Chief Quality Control Representative

Contractor's Mechanical Representative

Contractor's Electrical Representative

Contractor's Testing, Adjusting and Balancing Representative

Contractor's Controls Representative

Contracting Officer's Representative

Using Agency's Representative

Functional Performance Test Checklist - Fan Coil Units

The Contracting Officer will select fan coil units to be spot-checked during the functional performance test. All fan coil units shall be checked.

1. Functional Performance Test: Contractor shall demonstrate operation of selected fan coils as per specifications including the following:

a. Cooling only fan coils:

(1) Verify fan coil unit response to room temperature set point adjustment. Changes to be cooling set point to cooling set point minus 10 degrees and return to cooling set point. _____

(2) Check blower fan air flow. _____ L/s
Check blower fan air flow.

(3) Check cooling coil water flow. _____ L/s
Check cooling coil water flow.

(4) Verify proper operation of cooling water control valve. _____

b. Cooling/heating fan coils:

(1) Verify fan coil unit response to room temperature set point adjustment. Changes to be cooling set point to heating set point and return to cooling set point. _____

(2) Check blower fan air flow. _____ L/s
Check blower fan air flow.

(3) Check cooling coil water flow. _____ L/s
Check cooling coil water flow.

(4) Verify proper operation of cooling water control valve. _____

(5) Check cooling mode inlet air temperature. _____ degrees C
Check cooling mode inlet air temperature.

(6) Check cooling mode outlet air temperature. _____ degrees C
Check cooling mode outlet air temperature.

(7) Check heating coil water flow. _____ L/s
Check heating coil water flow.

(8) Verify proper operation of heating water control valve. _____

(9) Check heating mode inlet air temperature. _____ degrees C
Check heating mode inlet air temperature.

(10) Check heating mode outlet air temperature. _____ degrees C
Check heating mode outlet air temperature.

2. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

Signature and Date

Functional Performance Test Checklist - Fan Coil Units

Contractor's Chief Quality Control Representative

Contractor's Mechanical Representative

Contractor's Electrical Representative

Contractor's Testing, Adjusting and Balancing Representative

Contractor's Controls Representative

Contracting Officer's Representative

Using Agency's Representative

Functional Performance Test Checklist - Unit Heaters

The Contracting Officer will select unit heaters to be spot-checked during the functional performance test. All unit heaters shall be checked.

1. Functional Performance Test: Contractor shall demonstrate operation of selected unit heaters as per specifications including the following:

a. Verify unit heater response to room temperature set point adjustment. Changes to be heating set point to heating set point minus 10 degrees and return to heating set point. _____

b. Check blower fan speed. _____ rpm

c. Check heating mode inlet air temperature. _____ degrees C Check heating mode inlet air temperature.

d. Check heating mode outlet air temperature. _____ degrees C Check heating mode outlet air temperature.

2. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

Signature and Date

Contractor's Chief Quality Control Representative

Contractor's Mechanical Representative

Contractor's Electrical Representative

Contractor's Testing, Adjusting and Balancing Representative

Contractor's Controls Representative

Contracting Officer's Representative

Using Agency's Representative

Functional Performance Test Checklist - HVAC Controls

For HVAC System: All

The Contracting Officer will select HVAC control systems to undergo functional performance testing.

1. Functional Performance Test: Contractor shall verify operation of HVAC controls by performing the following tests:

a. Verify that controller is maintaining the set point by manually measuring the controlled variable with a thermometer, sling psychrometer, inclined manometer, etc.

b. Verify sensor/controller combination by manually measuring the controlled medium. Take readings from control panel display and compare readings taken manually. Record all readings.

Sensor _____
Manual measurement _____
Panel reading value _____

c. Verify system stability by changing the controller set point as follows:

- (1) Air temperature - 10 degrees F
- (2) Water temperature - 10 degrees F
- (3) Static pressure - 10 percent of set point
- (4) Relative humidity - percent (RH)

The control system shall be observed for 10 minutes after the change in set point. Instability or excessive hunting will be unacceptable.

d. Verify interlock with other HVAC controls.

e. Verify interlock with fire alarm control panel.

f. Verify interlock with EMCS.

[g. Change controller set point 10 percent with EMCS and verify correct response.]

2. Verify that operation of control system conforms to that specified in the sequence of operation.

3. Certification: We the undersigned have witnessed the above functional performance tests and certify that the item tested has met the performance requirements in this section of the specifications.

Signature and Date

Contractor's Chief Quality Control Representative _____

Contractor's Mechanical Representative _____

Functional Performance Test Checklist - HVAC Controls

For HVAC System: All

Contractor's Electrical Representative _____

Contractor's Testing, Adjusting and Balancing Representative _____

Contractor's Controls Representative _____

Contractor's Officer's Representative _____

Using Agency's Representative _____

-- End of Section --